News of the Industry Begins Page 669 APR 27 1931

AUTOMOTIVE INDUSTRIES

LAND AIR WATER

Volume 64
Number 17

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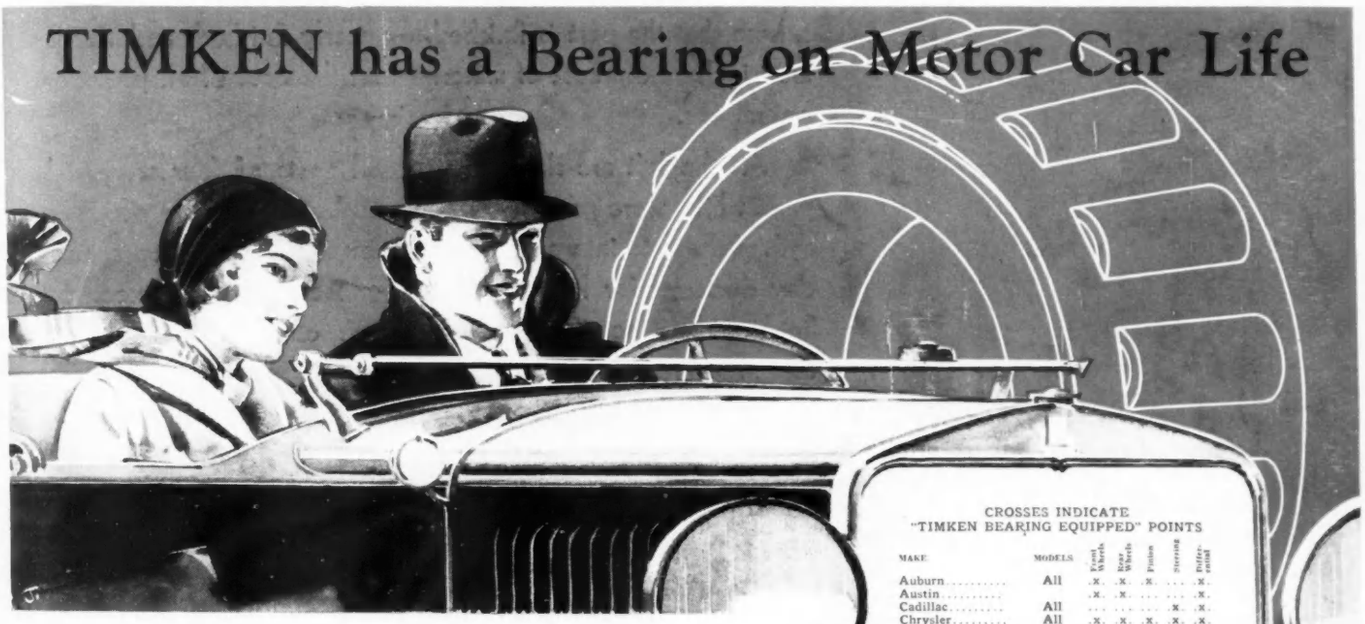
TIMKEN has a Bearing on Motor Car Life



A new interest has been kindled in automobile selection. Prudence and thrift have become new buy-words. Vital mechanical points are now rated far above features of mere eye appeal, for in the "mechanism" of a car lies its mileage life.

Timken has a decided bearing on motor car life. Millions of car owners know that Timken Bearings mean that wheels and shafts will turn easier, smoother, truer and longer.

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"TIMKEN BEARING EQUIPPED" POINTS

MAKE	MODELS	Front Wheels	Rear Wheels	Pinion	Steering	Differential
Auburn	All		x	x	x	x
Austin	All		x	x		x
Cadillac	All				x	x
Chrysler	All		x	x	x	x
Cord	All		x	x		x
Cunningham	All		x	x	x	x
DeSoto	6		x	x	x	x
	8		x	x	x	x
De Vaux	All		x	x	x	x
Dodge	6		x	x	x	x
	8		x	x	x	x
DuPont	All		x	x	x	x
Durant	All		x	x	x	x
Elcar	75		x	x	x	x
	95, 96, 120		x	x		x
Essex	All		x	x	x	x
Ford	All		x		x	x
Franklin	All		x	x	x	x
Gardner	All		x	x	x	x
Graham	Std. Six		x	x	x	x
	Special Six		x	x		x
	Eights		x	x	x	x
Hudson	All		x	x	x	x
Hupmobile	All		x	x	x	x
Jordan	All		x	x	x	x
Kissel	73 & 95		x	x	x	x
	126		x	x	x	x
LaSalle	All					x
Lincoln	All		x	x	x	x
Marmon	All		x	x	x	x
McFarlan	All		x	x	x	x
Nash	6-60, 8-70		x	x	x	x
	8-80, 8-90		x	x	x	x
———	All		x	x	x	x
Peerless	B & C		x	x		x
	A		x			x
Pierce-Arrow	All		x	x	x	x
Plymouth	All		x	x	x	x
Reo Flying Cloud	All		x	x	x	x
Reo Royale 8	All		x	x	x	x
Studebaker	All		x	x	x	x
Stutz	All		x	x	x	x
Willys	All		x	x	x	x
Willys-Knight	All		x	x	x	x

Tapered Roller TIMKEN BEARING EQUIPPED

TIMKEN Tapered Roller BEARINGS

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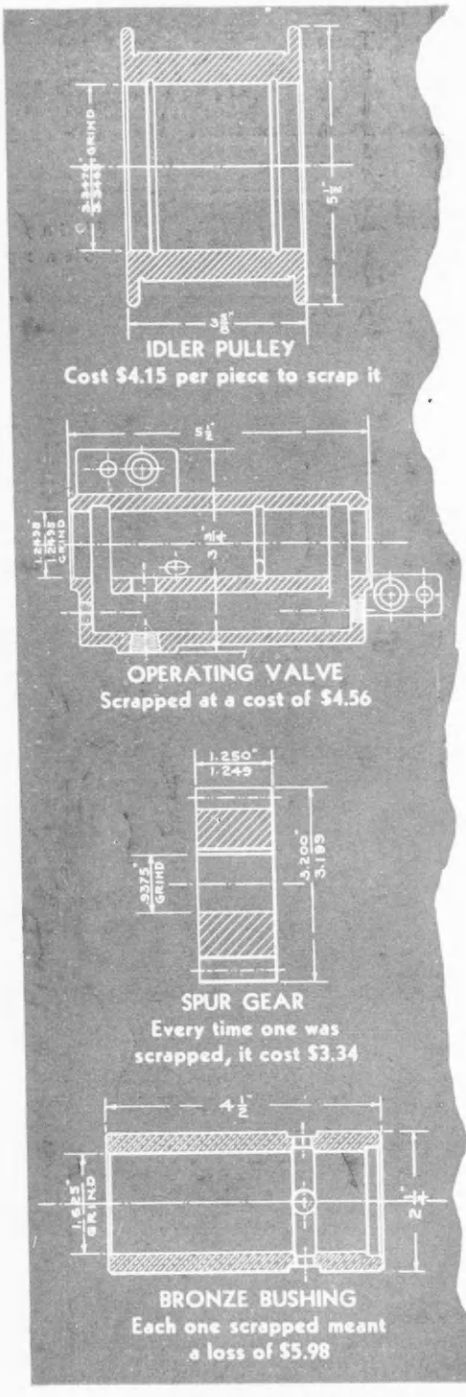
In The Grinding Department SCRAP IS EXPENSIVE


IDLER PULLEY
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SPUR GEAR
Every time one was scrapped, it cost $3.34
BRONZE BUSHING
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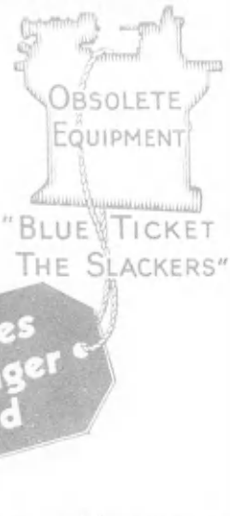
PROBABLY in no other department in your plant will you find that Scrap costs as much as in the grinding department. Not that the grinding operation is more expensive — although grinding on obsolete machines *is* expensive — but because it is here that the part is finished, or nearly finished, and Scrap must include the cost of material plus the cost of all previous operations.

At the left are shown the actual costs of four scrapped parts which were ground on machines built a number of years ago. Obsolete internals cannot be expected to meet present-day demands for high production, close limits and excellent finish without sacrificing one or more of these requirements.



In a year's time such expensive Scrap runs into hundreds of dollars — and it is regrettable because a large portion of it could be saved by using modern equipment that automatically sizes each piece of work.

If you have not made a record of the cost of your grinding Scrap, you should do so at once. Perhaps some of the waste is unnecessary, even with your present equipment. Phone Worcester or any of our branch offices for an engineer to go over your Internal and Surface grinding costs with you. No obligation, and it may save you many dollars.

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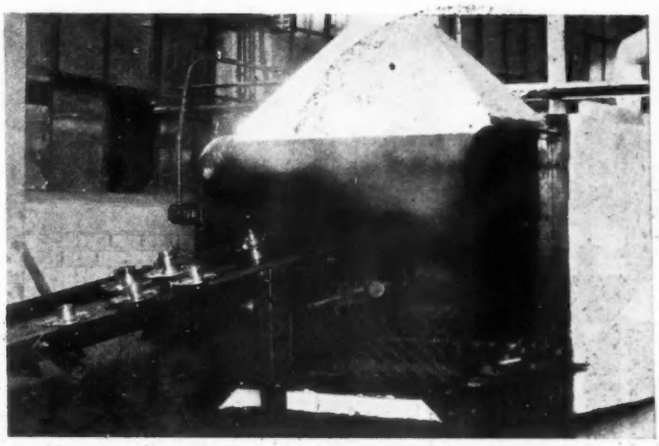

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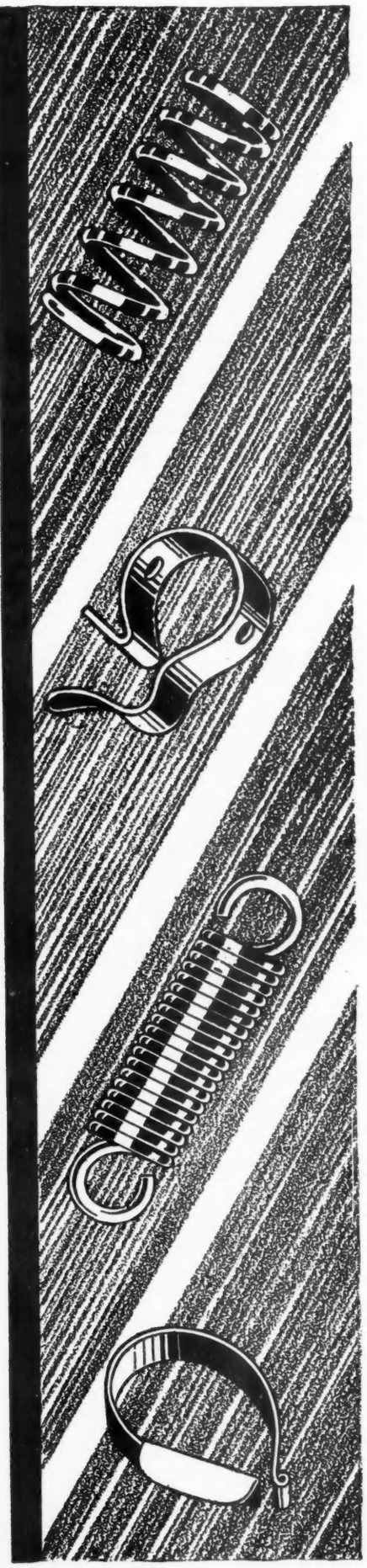

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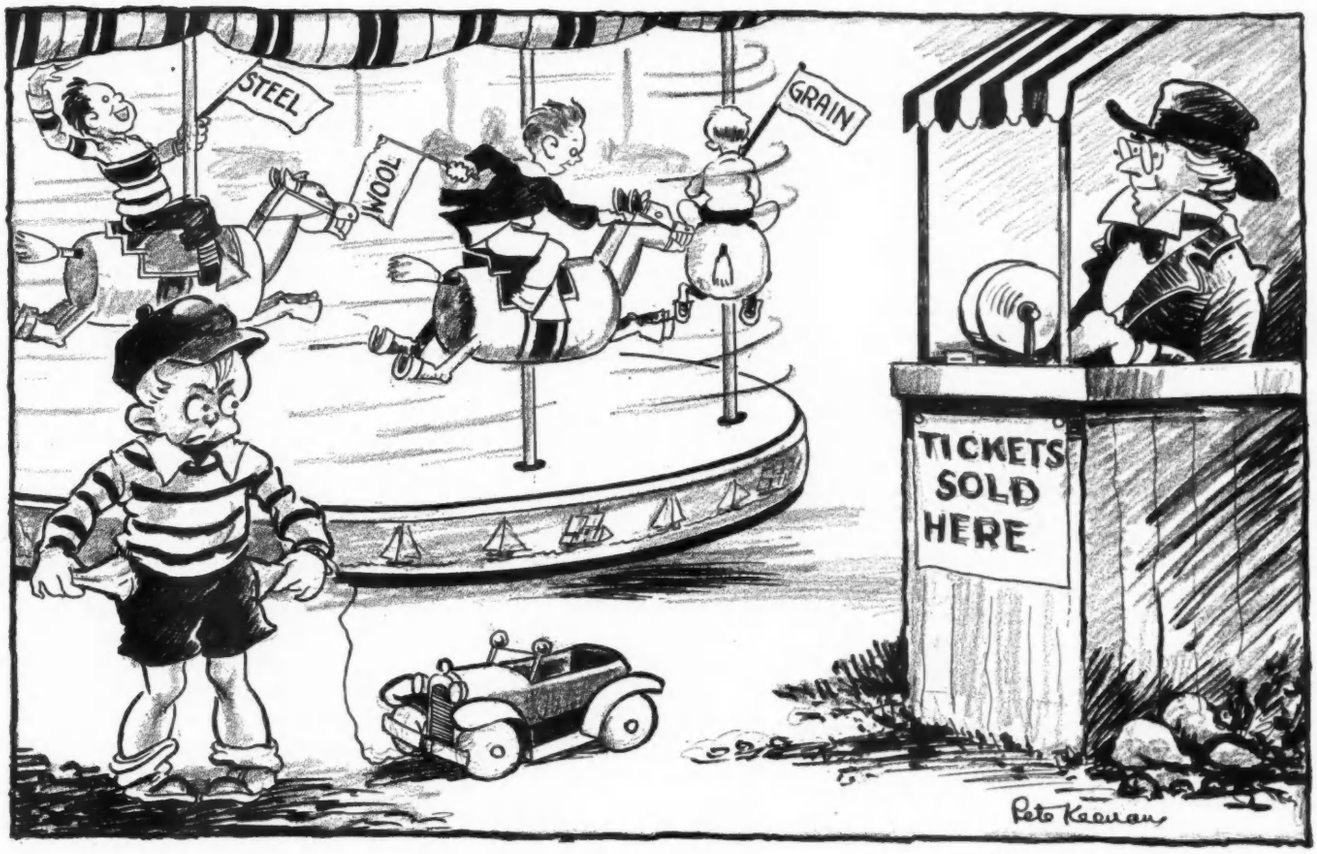
AUTOMOTIVE INDUSTRIES

VOLUME 64 APRIL 25, 1931 NUMBER 17

What Price Salvation For Export Markets?

By Leslie Peat



NEARLY a year ago the Hawley-Smoot Tariff was enacted after 18 months of legislative battling.

It was taken on faith by the automobile industry. Its shortcomings, as far as the industry was concerned, seemed to be outweighed by the flexibility clause and the proposed functions of the Tariff Commission, created by the Act.*

During the past year, however, a number of countries have adopted tariffs which seemed to United States exporters to have been retaliatory measures. Certain import duty specifications, which were included, restrict *only* United States-built motor vehicles in fact. There seems to be plenty of curbstone opinion in this country that our export markets for motor vehicles have been steadily discriminating against us in their tariff structures.

Important executives of the automobile industry now want to see something done to repeal these restrictive tariff schedules abroad. What can be done about it? A diligent search on our part in Washington disclosed no answer to this question. Government officials are in something of a quandary as to what to do or what to advise.

A careful study of the present Tariff Act and its administration since its enactment, and conferences with men close to the problem, indicate that not many things can be done about the alleged discriminations against United States cars and trucks because of our established national tariff policies.

But, our motor vehicle exports amount to about 16 per cent of our total production, valued at about $500,000,000 (see table, next page). A large percentage

*"Repercussion—An Export Factor," page 643, *Automotive Industries*, April 26, 1930.

of these sales units are produced in United States assembly and manufacturing plants abroad.

Thus far, there has been no public announcement of any concerted effort to relieve the export burden on that part of our export total which is affected by heavy, and apparently unreasonable, tariffs.

Now, let us look at a typical automotive manufacturing country which has allegedly shown discrimination against the United States. Czechoslovakia has established a quota system on arbitrarily high valuations and enactment of excessive duties. About 90 per cent of their imports during recent years have been of United States makes, manufactured here or assembled abroad. Czechoslovakia has an aggressive though small automobile industry; their claim that this tariff is for protection cannot be refuted with good grace, especially by us who, as a nation, early propounded the theory of a high protective tariff for home industries.

The United States manufacturers exported to Czechoslovakia, directly and indirectly, about 1500 automobiles and trucks in 1930. The total value of these vehicles was given as $1,500,000 or more.

Unofficial protests by government agencies and representatives of the industry have been of no avail, so the situation would seem to be ripe to invoke Section 338 of the Hawley-Smoot Tariff Act, and ask the President of the United States to proclaim either an embargo or a duty "not to exceed 50 per centum ad valorem or its equivalent" on, say, Czech shoes and glass imported into the United States on the basis of this alleged discrimination.

It is hard to conceive that the Chief Executive would jeopardize international goodwill with a bludgeon as drastic as an embargo.

The fundamental disadvantage which the export welfare of the automobile industry faces today is that the industry has been able to function without the aid of lobbies and has grown to its present gigantic size without aggressive interference with the mounting tide of legislation. Any embargo or tariff revision program favorable to the automobile industry would draw clear lines between the automotive and the consumer of imported commodities—a situation which car and truck manufacturers heretofore have been very careful to avoid.

From the earliest days of our national government, our policy has been to refrain from tariff bargaining. Today this is a part of our written law. To properly compete with foreign countries on the same terms with them, the United States would have to involve herself in numerous international agreements which would be contrary to our national policy. It seems doubtful that any serious consideration would be given to any plan that tends to upset this policy.

The crux of our present foreign export difficulty seems to be, then:

1. Is the automotive industry, as a whole, ready to take up cudgels for broad tariff reductions, by schedule or horizontal decreases on commodities imported into the United States, for the sake of the small percentage of its production which it exports? Can the industry in this country convince other industries here that automobile exports, via lowered United States import duties and the attendant lowered United States tariffs, are worth the price that *other* United States industries would pay?

2. Should the automotive industry reverse its present and long-standing policy and attempt to organize a costly lobby to set its interests against those of the consumer public on the one hand, and scores of other industries which import raw materials on the other hand—which directly or indirectly support the major part of the market for the 85 to 90 per cent of our motor vehicle production?

Perhaps the question as to what may be expected of our government in giving the automotive industry relief in its present difficulty might be answered after one of the above alternatives is decided upon by the industry.

Because of the complexity of the corporate structure of motor vehicle manufacturing companies, it seems unlikely that automobile executives would foster a program to upset the tariff program of this country.

Men who have applied themselves diligently to this problem during the past year feel that perhaps the answer lays in moral suasion. It has been suggested that if the President states the case in some public session of business men, foreign governments would take unofficial but serious notice of the public disfavor their tariffs are meeting in this country. Here, certainly, is one way to bring the matter to the fore without involving any lengthy legislation.

It has also been suggested that the industry engage in a strong publicity campaign, encouraging tourists to spend their time and money in "friendly countries." The United States tourist business hits the pocketbook in many foreign countries—this is a sure approach to government action anywhere on this globe. Any such action as this would get immediate attention abroad, as the subject would be brought up by the constituencies of foreign political leaders.

Then, too, it has been suggested that the industry might utilize its banking connections to discourage discriminatory practices by foreign governments. A lightly-dropped word to foreign interests seeking loans in Wall Street and its environs would be cabled back home with all haste. It is well known that foreign governments are always anxious to lend an attentive ear to American international bankers. History has shown that our brand of diplomacy has had its weaknesses, but it has also shown that American bankers get things done abroad.

If the automobile industry wants a ride on the international merry-go-round of tariffs, it will have to pay the price — either in hard cash or through some influential friends.

WE need more cooperation between American commercial, industrial and financial interests abroad—for instance, better team-work between some of those banks.

We need more vigorous export leadership on the part of our top executives—a more effective grasp of export realities by the chiefs of our great industries.

American export trade has a great future; on that indisputable fact we may center our firm hopes.

—Dr. Julius Klein, Assistant Secretary of Commerce.

Ratio of U. S. Exports to Production*

	1930	1929	1928	1927	1926
Units Exported	16.0%	17.8%	18.0%	18.0%	13.3%

*U. S. Exports, U. S. Foreign Assemblies and Canadian production.

JUST AMONG OURSELVES

Free Wheeling the Father of Easy Shifting

LEAVING competitive arguments aside for the moment, there can be no doubt whatever that the adoption of free wheeling by Studebaker, Hupmobile, Lincoln and Auburn has already obtained enough public interest to concentrate more attention on transmissions than these units have had in many years from automotive engineers.

There is scarcely a passenger car engineer of any importance in the industry who isn't studying gear-shifting and transmission devices and problems today with fresh interest.

"Will all cars eventually come to free wheeling?" "Is free wheeling just a fad that will pass in a year or so?" "Is free wheeling 'in' already?" These questions are being asked every time a few executives or engineers get together—and they are being answered in divers ways.

One sales-minded engineer expressed some thoughts on this subject during an informal conversation which seem to us worth repeating for what they are worth:

"In one sense," he said," "I think free wheeling can already be considered to have gone over successfully. On the other hand, even if it turns out to be very, very successful I don't believe that all the other makers necessarily will follow directly the lead of those who already have adopted it.

"It is more likely, as I see it, that other companies will go to work on various other types of easy gear-shifting devices, automatic transmissions, and similar units, which may or may not incorporate free wheeling as one feature.

"While various makers in the automobile industry have not hesitated to copy one another in the past and probably will not hesitate to do so in the future, I have a hunch that, in this particular case for competitive reasons, further steps rather than copies are likely to develop.

"In any case, I do believe that the companies which first put on free wheeling will be found to have been responsible for a marked commercial development of easier gear-shifting and easier operation on American automobiles during the decade beginning with 1930."

* * *

How the Ass Got His Reputation

THE following fable, read by Bill Mattox, Walworth Co. adv. mgr., at a Boston meeting a while back and picked up by us from its reprinting in *The Steel Founder*, organ of the Steel Founders Society of America, is commended to all automotive men who buy and sell—and don't we all?

The donkey was once esteemed as the wisest of animals.

The good Sheik El-Sta-Shun-Air owned a great herd of these sagacious beasts, which was the joy of his life. Other Sheiks came from all around to marvel at the wisdom of the herd.

One day came the Prophet himself—most learned and wise of all the sons of the East. With much glowing pride the Sheik led him out to the herd and said:

"Behold, O Prophet, the wise and talented asses. Converse with them, test them, and see if they are not verily wiser than 40 trees full of owls."

The Prophet addressed the asses. Said he, "Answer this question: What should an ass require for a three days' journey?"

They counselled among themselves and made reply: "For a three days' journey, O Prophet, any ass should require six bundles of hay and three bags of dates."

"Very good," quoth the Prophet, "that soundeth like a fair and proper price." Whereupon the Sheik chuckled, saying, "Did I not tell you they are passing wise?"

The Prophet answered, "Wait," and again he addressed the asses. "I have to make a three days' journey but I will not give you six bundles of hay and three bags of dates for making it. Let him who will go for less, stand forth."

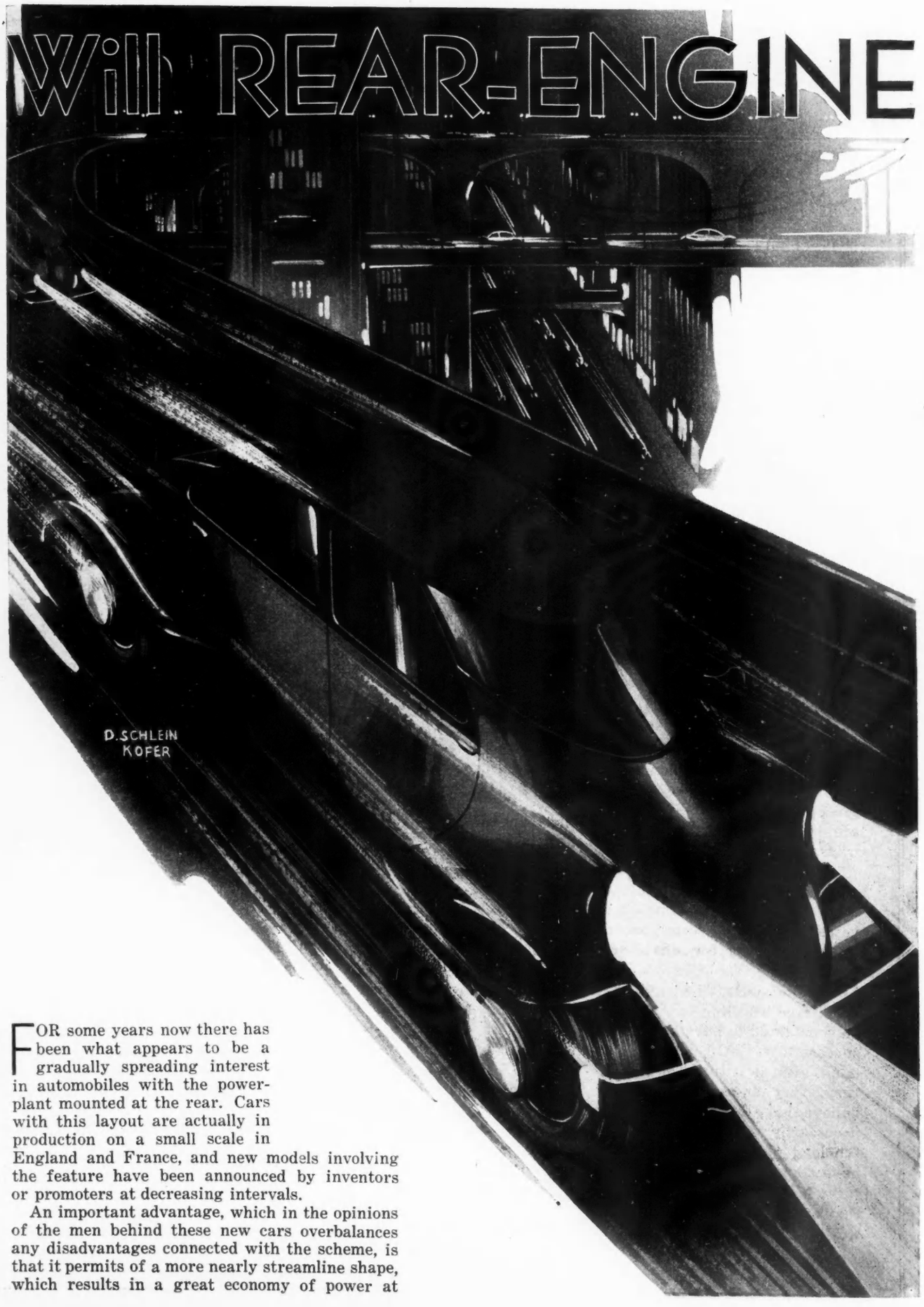
And behold, they all stood forth. One would go for six bundles of hay and one bag of dates, until finally one especially long-eared ass agreed to go for one bundle of hay.

Then spoke the Prophet: "Fool," quoth he, "you cannot live for three days on one bundle of hay, much less profit from the journey."

"True," replied the long-eared one, "but I wanted the order."

And from that far-off day to this, asses have been known as fools and price-cutters have been known as asses.—N. G. S.

Will REAR-ENGINE



FOR some years now there has been what appears to be a gradually spreading interest in automobiles with the power-plant mounted at the rear. Cars with this layout are actually in production on a small scale in England and France, and new models involving the feature have been announced by inventors or promoters at decreasing intervals.

An important advantage, which in the opinions of the men behind these new cars overbalances any disadvantages connected with the scheme, is that it permits of a more nearly streamline shape, which results in a great economy of power at

Design Come BACK?

by
P. M. Heldt

THIRTY YEARS ago the rear-engined car was dealt what seemed a death-blow.* Now its ghost walks, and to all appearances it is a very live ghost.

It stalked boldly through some of the sessions of the last S. A. E. Annual Meeting.

It flits fugitively through the experimental laboratories, a lurking shadow in the background.

What is going to be done about it? Shall the industry remain haunted?

The past and present of the rear-engined car are reviewed in this article, first of a series, by P. M. Heldt.

It tells why the engine was originally in the rear, and how it finally got up ahead of the driver.

Next week (May 2) Mr. Heldt raises the question—"Do today's demands for car performance obsolete present conventional design?"

Many important engineering executives expect to see some basic changes in design in the near future.

Has the engineering of today anything to offer the demands of tomorrow's car owner?

Our May 9 Issue will contain some fine engineering discussion on this point.

Streamlining! That's a magic word, these days of speculative thinking. What can we expect of streamlining? This topic, with particular reference to the needs of today, is told in the last of this series, May 16.

When you have finished reading the series you will be able to better form your own estimate of what will happen in the future, with respect to this important, fundamental question of automobile design.

Credited with being the oldest automobile in existence this Haynes had a rear-mounted engine + + +

high speeds, and that it eliminates annoyances to passengers from heat, noise and odors from the engine. There is also one other point to be considered in connection with cars having the powerplant at the rear. They possess what is generally regarded as the chief advantage of the front drive, the elimination of a propeller shaft extending underneath the floor of the car, without being open to the possible objection sometimes offered to that drive, the possibility of insufficient traction when the greatest propelling effort is required.

Most of those who have sponsored cars

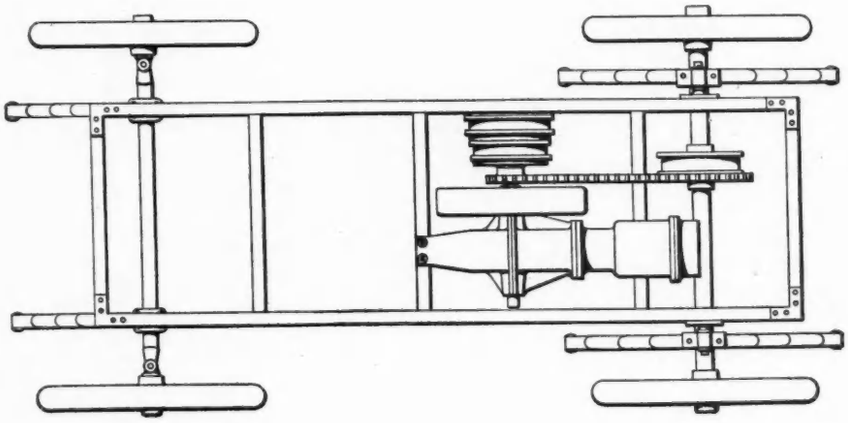
*See the first paragraph of Mr. Heldt's article.

with rear-mounted powerplants so far are men who have been connected with the aircraft industry, who have learned through experience the great savings that can be made at high speeds by proper streamlining.

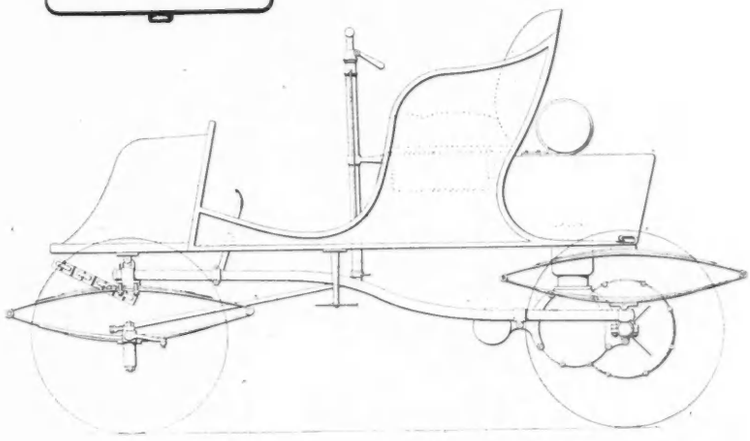
Placing the engine in the rear is by no means a new practice, for practically all of the early cars built in this country had their powerplants under the seat and under a rear deck. One does not have to look far for the reasons for putting the powerplant in this location in the first place. The only models the early automobile designers had to guide them were horse carriages, and the only place on these where a powerplant could be placed and be relatively inconspicuous was under the seat. Many of the early motor vehicles were of the runabout type and were provided with a rear deck extending back from the seat, to enlarge the space in which the powerplant could be located.

The powerplant of an automobile was first placed in front under a bonnet by Levassor, of the firm of Panhard & Levassor, in 1891. This car was fitted with a two-cylinder Daimler engine of what would today be called the small-angle-V type, the two cylinders making a slight angle with each other and the pistons of both acting on the same crank. In one of the first cars built by Daimler (1886) a similar engine was located at the very center of the vehicle and projected up through the floorboards of the rear compartment. Daimler and his licensees started out with vertical engines, which, of course, it was practically impossible to conceal under the seats, and this is probably the reason why front-mounting of the engine was adopted in Europe at a comparatively early date. It must not be understood, however, that all European cars built during the nineties had the engine in front. The earliest Benz car had a rear-mounted single-cylinder horizontal engine set on edge, so its large flywheel would not protrude too much from the body, and possibly also so it would not interfere with the steering by its gyroscopic action. Daimler continued to build cars with engines in the rear until 1897 or 1898, and in France the Peugeot, the DeDion, and other well-known makes all had rear-mounted engines.

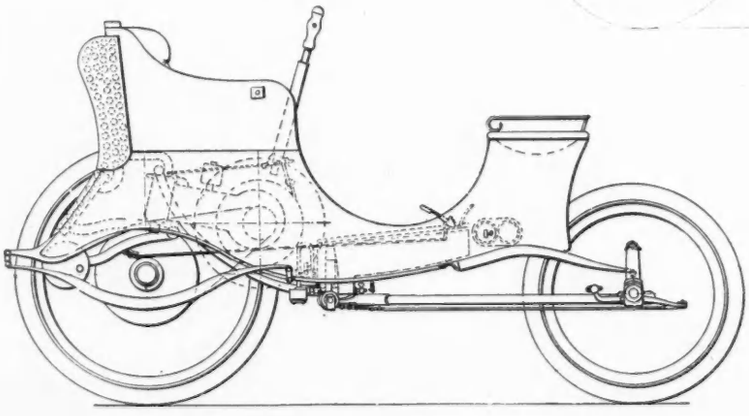
The early American makes all had horizontal engines, which lent themselves better to mounting under the seat. A common arrangement was to have a single-cylinder engine located under the rear deck to one side of the center, with the cylinder extending toward either the front or the rear, and a transmission located alongside of it in direct continuation of its crankshaft. The transmissions of that period were either of the geared type with a friction clutch for each speed, or of the planetary type, and in either case the drive to the rear axle was by a roller chain. This arrangement was fairly satisfactory as long as



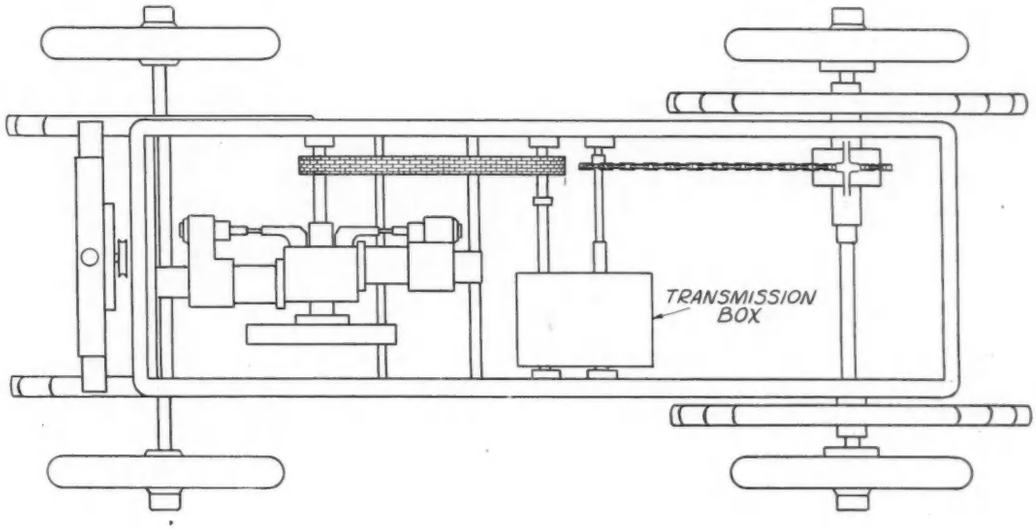
This chassie plan is characteristic of a whole group of early American cars of which the curved-dash Oldsmobile was one of the most popular. The engine was located under the single seat and the rear deck



Another class of early rear-engined cars is represented by the Pierce-Arrow motorette, here shown in side elevation. The vertical single-cylinder engine, together with its two-speed and reverse transmission, is mounted directly on the rear axle + +



Left—In the Duryea car a three-cylinder engine was used, the overall length of which was comparatively small and which could therefore be placed under the main seat. This car had single-lever control + +



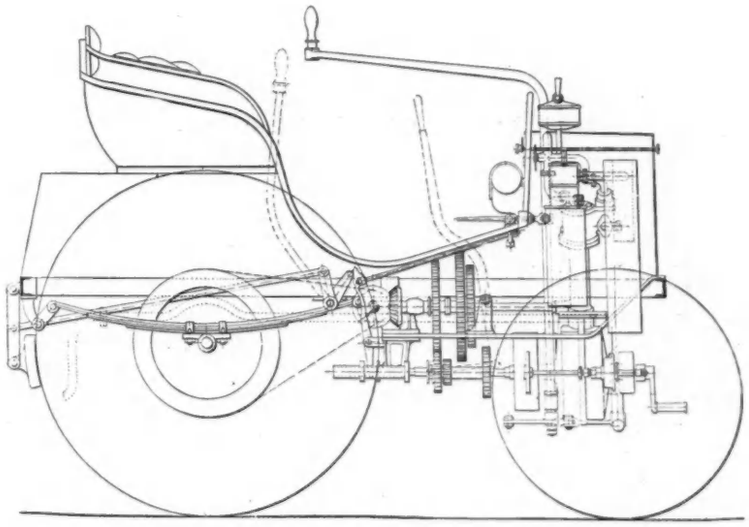
In this Haynes-Apperson car, which was built in 1904, the double-cylinder opposed engine is located under the floorboard of the driver's compartment. Earlier cars of the same make had the engine at the rear and the transmission in line with it

single-cylinder engines were used, for which there was adequate space under the seat and rear deck, besides which the parts requiring most frequent attention, such as the spark mechanisms and the carburetor, were near the extreme rear end of the body and therefore tolerably accessible.

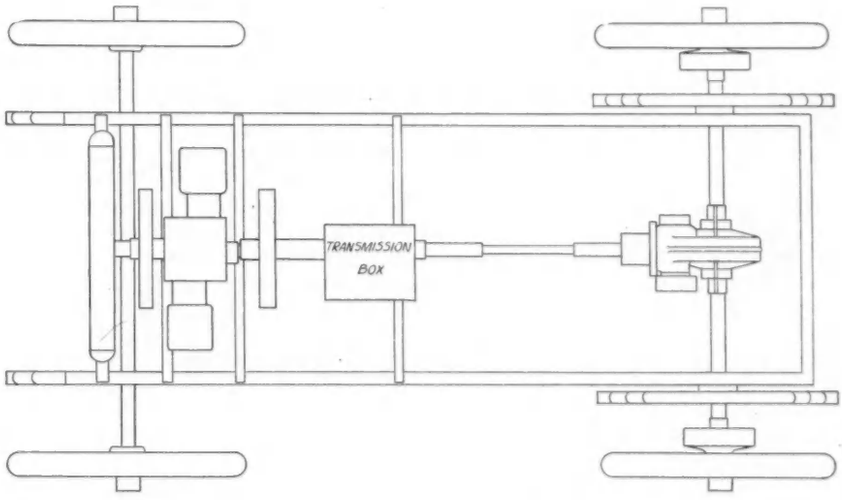
The single-cylinder horizontal engine was succeeded by the double-cylinder opposed engine, and already with this the rear-mounting became rather awkward, especially where engines of fairly large dimensions were used, as the length of the engine was then quite large, and in order to make the chain drive possible the crankshaft axis had to be maintained at a considerable distance ahead of the rear axle. This brought the head of the forward cylinder quite far forward.

In view of the fact that it has been proposed recently to "sneak" the powerplant from the front to the rear it is interesting to observe that something of the sort was done about 30 years ago when the reverse change took place. At least a number of cars were built in this country in which the powerplants were so located that one could not say either that they were in the front or that they were in the rear. This applies notably to the Haynes-Apperson car of 1902, of which a plan view is shown herewith. The double-cylinder opposed engine was located under the floorboards of the driver's compartment with its crankshaft transverse to the frame. It is obvious, therefore, that the engine was not removed from the rear to the front all at once, but in a number of steps.

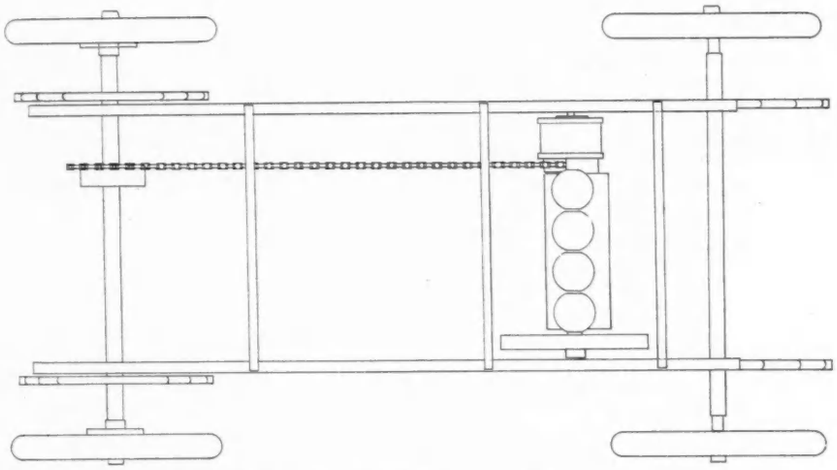
When the change to the four-cylinder vertical engine came, a year or so later, it was clearly impossible to continue to mount the



This is a side elevation of the Panhard Levassor car of 1894, the prototype of our modern designs with engine in front and drive by shaft to the rear axle + + +



One of the first American cars with engine in front was the Autocar of 1892, of which a chassis plan is here shown. The engine was of the double-cylinder opposed type and shaft drive was used + + + + + +



One of the first American cars with front-mounted vertical engine was the Franklin of 1903. Its four-cylinder, air-cooled engine set transversely across the frame and drive was through a single long chain

powerplant under the seats and rear deck. Generally speaking, this change was a result of European influence, European countries at that time leading in automobile design both as regards the amount of power available and as regards the perfection of detail, and the four-cylinder engine and front mounting were adopted together. It is worthy of note, however, that the two first successful cars on the American market with front-mounted engines, both of which appeared in 1902, were not copies of European designs but strictly American productions. They were the four-cylinder, air-cooled Franklin, in which the engine was mounted transversely under a hood in front, with drive by a single long chain to the rear axle, and the Autocar with a two-cylinder, horizontal-opposed engine which had a shaft drive.

It may then be said that what led to the abandonment of the rear-mounted engine in this country between 1902 and 1908 was the gradual enlargement of engines and the multiplication of cylinders, which made it practically impossible to find room for the powerplant within a body of the type then current.

Lubricating Oil and Detonation

R. O. KING and H. Moss in *Engineering* of London describe a series of researches carried on to determine the effect of lubricating oils on detonation. They had previously shown that the high anti-knock value given to fuels by benzol and metallic dopes is generally diminished when lubricating oil is distributed throughout the fuel-air mixture during combustion. Three types of oils were used in the earlier experiments, viz., vegetable oils (rape and castor), oleine and oleic acid fatty oils usually derived from animal sources, and mineral oils (two proprietary blends). The detonation-inducing actions of the three types of oil differed remarkably and varied with the substance used to increase the anti-knock property of the original fuel. The deleterious effect was greatest when iron or nickel carbonyl was used as fuel dope. Mineral oil had the least, and oleine or oleic acid the greatest effect on the anti-knock properties of fuels containing carbonyls. Considering fuels improved by tetra ethyl lead or benzol, the vegetable oils were least and oleine and oleic acid most harmful, mineral oils occupying an intermediate position. Rape and castor oil were found to be unique in giving a small increase in the anti-knock value of fuels containing ethyl.

The recent experiments, dealt with in detail in the article quoted, were directed to determine to what extent the observed unequal effects were due to special properties of the constituents of the mineral oil blends. The action of these constituent oils on fuels improved in anti-knock value by ethyl fluid or benzol was determined at normal and high induction temperatures. In addition the scope of the work was extended by determining the effect of the various mineral oils on fuels improved by the addition of naphthenes, since the superior anti-knock value of certain natural fuels is due mainly to their considerable content of these substances.

The conclusion is reached that when lubricating oil is distributed throughout doped fuel during combustion, the deleterious action of the oil is effective mainly on the metallic dope content, and the action is most striking when the metal is an active catalyst such as nickel and the oil used, e.g., oleic acid, is an active poison with respect to the metal catalyst. On this basis a given quantity of oil should destroy the effect of an equivalent quantity of metallic dope; a conclusion which is justified by the earlier experiments made with iron and nickel dopes in association with oils more active chemically than the mineral oils. The specific action is less clearly defined when lead dope is used in association with mineral oils.

In the case of a gasoline-benzol mixture, the deleterious effect of distributed mineral oil on the anti-knock value increases as the highest useful compression ratio of the fuel is increased by the addition of more benzol. The effect varies from nothing for a highest useful compression ratio of 4.3 (which presumably means no benzol addition) to 0.3 compression ratio for a mineral oil content equal to 8 per cent of the fuel content when the highest useful compression ratio is 6.3, in linear relation. In the case of gasoline doped with ethyl fluid, on the other hand, as the highest useful compression ratio is increased by the gradual addition of more ethyl fluid, the effect of the distributed mineral oil reaches a maximum of about 0.26 compression ratio for 8 per cent of oil when the maximum useful compression ratio is 5.75, and then diminishes in spite of further additions of ethyl fluid. The diminution of deleterious effect is due to the fact that equal additions of ethyl fluid become progressively less effective as the total increases.

Low Cost is Principal Advantage of Two-Cycle Engines for Small Planes

This type of engine can probably be developed to excel the four-cycle engine in dependability and has a comparatively low weight and minimum maintenance cost + + + +

Abstract of paper to be presented at the Fifth National Technical Aeronautic Meeting, Baltimore,

by J. H. Geisse

vice-president, Comet Engine Corp., Madison, Wis.

MR. GEISSE bases his arguments regarding the adaptability of the two-stroke-cycle engine for aircraft on the following quotation from Harry Ricardo's new book on High-Speed Internal Combustion Engines:

"They are, for example, especially suited for auxiliary engines for sailing yachts, motorcycles, agricultural purposes, and for all purposes where low first cost is the most important consideration, where, owing to the short period that they are required to work, the fuel consumption is not a serious item, and where they are not called upon to run at widely varying speeds or under widely varying loads. For all such purposes the two-cycle engine using crankcase compression and scavenging with combustible mixture has a wide scope, and it is probably the simplest form of prime mover in existence, has very few parts, and is exceedingly cheap to produce."

According to the above, the principal advantage of the two-cycle engine is its low first cost. In civil aviation, and especially where small private planes are concerned, the most important consideration in connection with the engine, with the single exception of dependability—and the two-cycle engine can probably be developed to excel the four-cycle engine in this respect—is low first cost. To attain any large volume of sales of small private planes, the most necessary step is to produce planes that are much safer and easier to fly than present types; but the next most important item is cost, and this makes cost the first consideration in the choice of the engine. Owing to the fact that our present small scale of production places the sport plane in the class of high-priced luxuries, even slight reductions are of great importance, increasing the market out of all proportion.

Further, in the case of the sport airplane, the cost

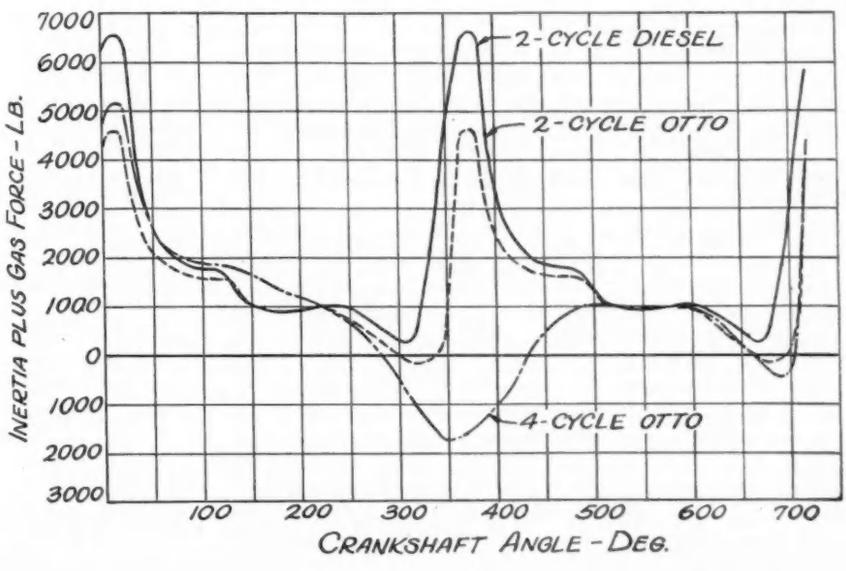


Fig. 1—With normal reciprocating weights and present speeds, the inertia load in a single cylinder is almost one-third the maximum explosion load, and the accompanying graph is a comparison of connecting rod loads in typical two and four-stroke Otto engines and two-stroke Diesel engine

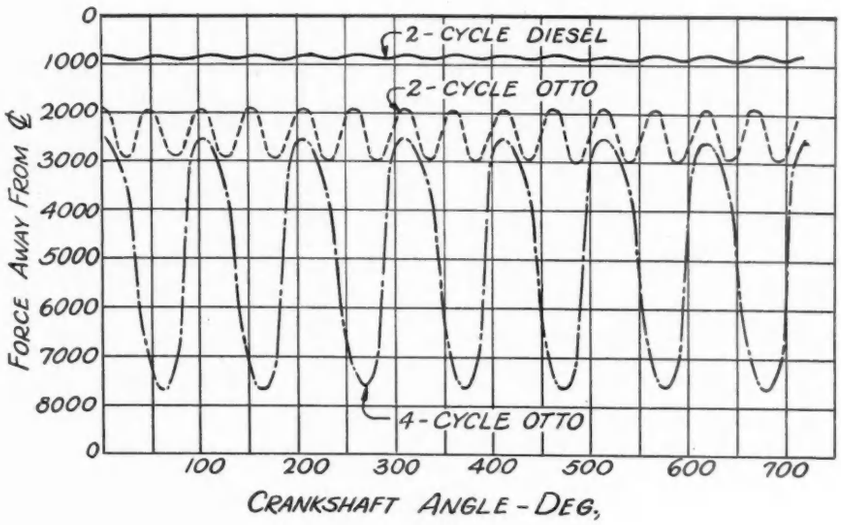
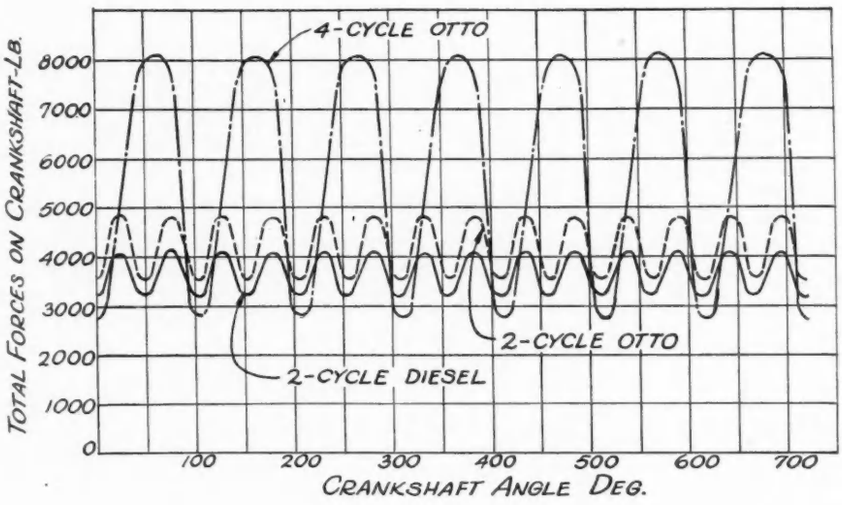


Fig. 3 (right) — Radial components of total crankpin loads in seven-cylinder radial engines

Fig. 2 (below)—Total crankpin loads for seven-cylinder radial engines + + + + +



of operation is dependent directly upon the first cost, depreciation due to obsolescence being about 25 per cent, and insurance against damage to the plane, 10 per cent of the first cost per year. By reducing the face value of the insurance policy 25 per cent each year and figuring interest on investment on the same basis, the average operating cost per year becomes 35 per cent of the first cost.

The second requirement is low operating time, and this applies in the case of privately-owned planes, which, according to the best information available, are operated not to exceed two hours per week on the average. This requirement is based on the higher fuel and oil consumption of the two-cycle as compared with the four-cycle engine, but the slight increase in the cost of fuel and oil will probably be more than offset by a reduction in maintenance charges. Fuel and oil cost for a 150 hp. engine operated for 104 hr. will be approximately $350, while the cost of overhauling such an engine, not including replacements, is about $250, so that an increase of 10 per cent in the fuel and oil cost would be compensated for by a 14 per cent reduction in the cost of overhauling. This is on the assumption that an overhaul is made every 104 hr., and it is safe to assume that any private owner will have his engine overhauled once each year regardless of its mileage. It will be shown later, however, that although the fuel and oil consumption are greater in the case of a two-cycle engine on a lb. per hp.-hr. basis, the comparison may be in favor of the two-cycle on a miles per gallon basis—a more important figure.

In regard to the third requirement, that the engine shall not be called upon to run at widely varying speeds and under widely varying loads, the aviation engine ranks with the marine engine in that their is a fairly definite relation between speed and load throughout the operating range.

Two requirements in the small-sport-plane industry which are met by the two-cycle engine and which are not mentioned in the list of qualities given by Ricardo are low weight and minimum maintenance cost.

Only those who are familiar with radial air-cooled engines of today appreciate how much attention they require. In transport service this represents an increase in operating cost, but does not affect the sale of planes. In school service the importance of this factor is small, as the servicing is done by instructors and students. In the sport plane field, however, this requirement of constant care affects the volume of sales directly. Many a person who otherwise might be a good prospect would balk at the necessity of greasing the rocker arms whenever he wished to fly, and of inspecting the valve-tappet clearance every 10-20 hours of flying. These requirements being connected with the valve gear, they are absent in the two-cycle engine.

The extent to which engine weight can be reduced by the adoption of the two-stroke cycle is a controversial point. Some take the standpoint that no material reduction can be made, owing to the low m.e.p. of the engine and to the loss of effective stroke due to the ports. The latter factor, of course, is included in the former, since the m.e.p. is always calculated on the basis of the full stroke.

Mean effective pressures of two-cycle engines range all the way from 30 to 100 lb. p. sq. in., and it is not easy to determine why some are low and some high. The m.e.p. is dependent on charge efficiency, which in turn is dependent on the volumetric efficiency of the scavenging pump and on the efficiency of scavenging. Both are functions of port timing and port arrangements.

There is a general tendency to underestimate the rapidity with which a cylinder may be scavenged and recharged. In view of the fact that practically all text books stress the extremely short time available for scavenging a two-cycle engine and the reduction in the effective stroke by the ports, the high degree of development achieved in small outboard engines is rather encouraging to the two-cycle advocate. In these small engines an m.e.p. of better than 50 lb. p. sq. in. is maintained up to 5000 r.p.m., and the "Speedy Bee" is credited with an m.e.p. of 68 lb. at 6600 r.p.m. This pressure and speed correspond to an output of 1.1 hp. per cu. in. while 0.34 hp. per cu. in. is a creditable performance for four-stroke aircraft engines. It is true that these results are obtained from cylinders of very small bore, in which the port opening areas bear a larger ratio to the cylinder volume than in a larger cylinder, still the results are very encouraging.

It would seem therefore that instead of the two-cycle engine being limited by the time required for scavenging to a lower speed than the four-cycle, the opposite is true because of the limitation imposed on the four-cycle by valve-gear acceleration loads.

The small outboard engines employ crankcase scavenging, and there seems to be considerable difference of opinion with regard to the volumetric efficiency of such systems. Otto Holm (N.A.C.A. Technical Note No. 446) claims to have increased the volumetric efficiency of the crankcase scavenging system from 50 per cent to 100 per cent by reducing (not increasing) the exhaust port lead, and another investigator gave a similar report. In direct contrast to these results are statements made by Mr. Ricardo, who quotes results obtained by Professor Watson on a Day engine, showing less than 50 per cent efficiency, and also gives a mathematical analysis indicating a possible maximum efficiency of 50 per cent.

An example of what may be accomplished with the two-stroke cycle with other than crankcase scavenging is found in the report of the N.A.C.C. dealing with its experiments on a modified Liberty cylinder. Using the two poppet valves in the head as the exhaust valves, and piston-controlled inlet ports, it was found possible to obtain 50 hp. from this cylinder, as compared with 27.5 hp. when operating on the four-stroke cycle. By using fuel injection, a specific fuel consumption as low as 0.55 lb. p. hp.-hr. was obtained with an output of 40 hp. Junkers in his two-cycle aircraft engine operating on the Diesel principle obtains an m.e.p. of 99.5 lb. p. sq. in., equivalent to 199 lb. p. sq. in. for a four-stroke cycle engine. Both of these engines use so-called uniflow scavenging.

The next point to be considered is that of stresses, and here we find the two-stroke greatly superior to the four-stroke cycle. With normal reciprocating weights and present speeds, the inertia load in a single cylinder is almost one-third the maximum explosion load, and Fig. 1 is a comparison of connecting-rod loads in typical two- and four-stroke Otto engines and a two-stroke Diesel engine. For the two-stroke cycle the load varies between 4600 lb. compression and 250 lb. tension, a range of 4850 lb., whereas for the four-stroke cycle it varies between 5200 lb. compression and 1800 lb. tension, a range of 7000 lb. As the power output of the two-stroke cylinder under consideration is 40 per cent greater than that of the four-stroke cylinder, the possibility of a reduction in rod weight per hp. is evident. By adopting the double-acting principle, quite common in large Diesel powerplants, a further reduction in maximum stress can be made.

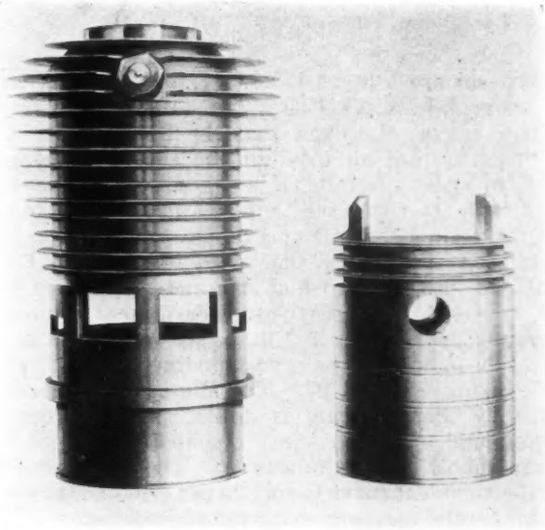


Fig. 5—Cylinder and piston of Aircraft Holding Co.'s radial engine, showing the large ports + + + + + + +

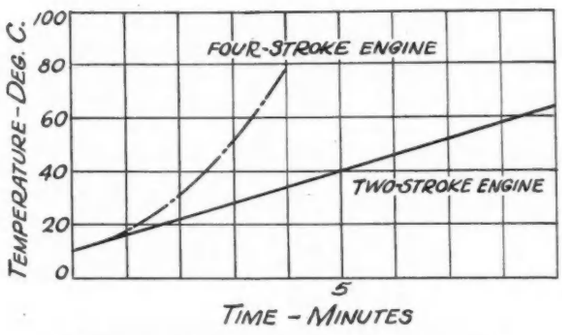


Fig. 4 — Time required to heat equal quantities of water by circulation in two-stroke and four-stroke engines + +

Next the crankshaft and the bearing surfaces required demand consideration. In the case of a single-cylinder engine the possible saving in weight is about the same as for the connecting rod. But when more than one rod are connected to one crankpin, the possible saving in weight is much greater, and Fig. 2 is a comparison of crankpin loads for two- and four-stroke Otto cycle and two-stroke Diesel cycle seven-cylinder radial engines. The peak loads are 8100 lb. for the four-stroke Otto, 4800 lb. for the two-stroke Otto, and 4100 lb. for the two-stroke Diesel. The areas under the respective curves, which represent bearing wear, are in the proportion 1.00 : 0.75 : 0.65, and if corrections are made for differences in power, 1 : 0.536 : 0.475. Fig. 3 shows the radial or useless forces on the bearings of these engines, and the areas under the curves again represent bearing wear, but in this case wear due to useless forces on the crank. The

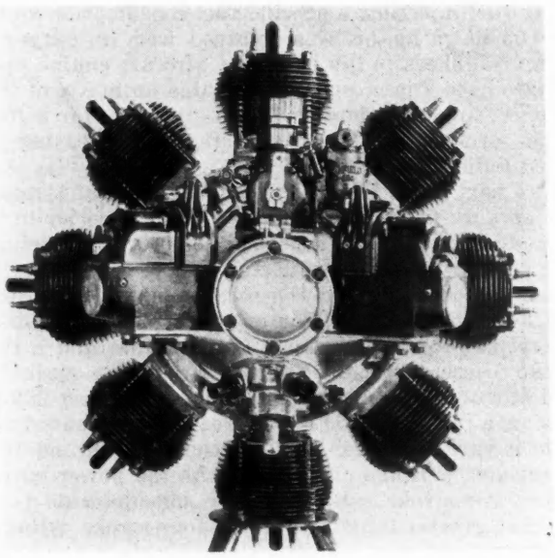


Fig. 6 — The Hurricane eight-cylinder radial engine has a dry weight of 1.5 lb. per hp. + + + + + + + +

proportions are 1.00 : 0.475 : 0.17, and when corrected for power differences, 1.00 : 0.34 : 0.115.

These curves also show that the Diesel cycle—I do not mean by that an auto-ignition engine running on the Otto cycle—permits of a weight saving as compared with the Otto cycle, and this in spite of the fact that the ratio of mean to maximum pressure was considerably better in the Otto card than in the Diesel card used—a relation which can and probably will be soon reversed. The Otto-cycle card used showed a maximum pressure of 450 lb. p. sq. in. and an m.e.p. of 132 lb. p. sq. in., the corresponding figures for the Diesel being 550 and 97. The Diesel cycle as represented by that diagram is almost perfect from the bearing-load and crankshaft standpoint, the load on the pin almost entirely tangential. The area under the radial-component curve is only 25 per cent of that under the tangential-component curve, whereas it is 75 per cent for the Otto two-stroke cycle, and 220 per cent for the Otto four-stroke cycle.

Considering the above it is very difficult to understand why such firms as Packard and Clerget have chosen a four-stroke cycle for their radial auto-ignition engines. They did not have to face the objections that are raised to the two-stroke Otto and had a background of two-stroke Diesel engine experience not available in the two-stroke Otto cycle. In a recent listing of commercial Diesel engines there were 19 two-stroke-cycle, as against 21 four-stroke-cycle types; the former averaged 270 lb. p. hp., as compared with 333 lb. p. hp. for the latter, though both types of engine included probably were not designed with any view to weight saving. When it is considered that the possible reduction in weight by the use of the two-stroke cycle is least in the in-line type of engine, which alone is represented in the list, the weight difference shown is quite important.

An additional advantage of the two-stroke cycle for aircraft engines is the reduced jacket loss per hp. This permits a direct saving in weight in the cooling system and an indirect saving in engine weight due to reduction of the wind resistance of the cooling element. As much as 20 per cent of the total engine power has been used to move the cooling system through the air, and even if 10 per cent be taken for the average, if this could be reduced one-half it would be a direct saving of five per cent on engine weight. The only experimental data available on this point are from an article by J. Jalbert in *L'Aeronautique* of July, 1925, and are reproduced in Fig. 4, which shows the relative times required to heat a given quantity of water in the jackets of a two-stroke and a four-stroke engine of 140 hp. These curves show a reduction of 50 per cent in the jacket loss for the two-cycle engine. That there should be a reduction is to be expected from the fact that the exhaust gases are cleared from the cylinders in much less time, and another important factor in this connection is that the exhaust passages in the ported two-cycle engine provide a much less restricted outlet.

As regards the greater fuel consumption of the two-cycle engine, the saving due to a reduction in cooling requirements, estimated at five per cent, would compensate for an equal increase in specific fuel consumption. Starting and idling are closely related to attainment of high m.e.p. without excessive fuel consumption, as all require stratification, and while all of these constitute problems in some two-cycle engines, the author does not feel that they will be found very difficult of solution, since he is familiar with one engine that idles as nicely as, and another that starts more readily than, any four-cycle engine.

In view of the various advantages of the two-cycle engine enumerated in the foregoing, the question is likely to be asked, "Why has not this engine been developed for aviation?" The question cannot be answered directly, but the reason is probably similar to that which caused neglect of air cooling for a long time. Not so very long ago all of our aviation engines were water-cooled, and if it had not been for a very few adherents of the direct air-cooled type who had the courage to go ahead with their developments, in the face of an identical question relative to air cooling, we should still have 100 per cent water cooling.

Although, so far, no two-cycle engines have been submitted to the Department of Commerce for approval, quite a number are in course of development. The Aircraft Holding Co. of Culver City, Calif., has two radial engines, a six and an eight. The six-cylinder is rated at 80 hp. at 1250 r.p.m. and gives an m.e.p. of 52 lb. p. sq. in. The eight is rated at 120 hp. at the same speed and shows 58 lb. m.e.p. Cylinders and crankcase are machined of steel, and a positive-displacement scavenging pump mounted at the rear is driven directly from the crankshaft. The specific weight of the six-cylinder is 2.62 lb. p. hp.

The Hurricane Aviation Corp. of Houston, Tex., has an eight-cylinder radial engine rated at 150 hp. at 2000 r.p.m., which gives an m.e.p. of 75 lb. p. sq. in. Its dry weight is 1.5 lb. p. hp.

The Light Manufacturing & Foundry Co., Pottstown, Pa., has three lines of crankcase-scavenged two-cycle engines. The smallest is a two-cylinder in-line type weighing 3 lb. p. hp. and rated at 20 hp. at 2300 r.p.m. Provided with a gear reduction to give a propeller speed of 1500 r.p.m., this same engine is rated at 30 hp. Both engines are said to operate at 60 lb. m.e.p. The third engine is a four-cylinder opposed type developing 50 hp. at 1500 r.p.m., with a specific weight of 2.7 lb. p. hp. this also being a geared engine. All three engines have the same cylinder dimensions.

For the very light plane class the Cleone Company has two engines, of 8-12 and 25 hp. respectively. The latter, a two-cylinder opposed type weighing 47 lb., operates at 2600 r.p.m. and develops an m.e.p of 48 lb. p. sq. in. The specific weight of 1.88 lb. p. hp. is remarkably low for so small an engine.

PRODUCTION LINES

Salvage the Waste

UTILIZATION and control of waste were discussed by C. H. McKnight (General Electric) and R. R. Rees (Packard), at the National Management Congress last week. Started with the setup of a real salvage department and stressed the importance of proper segregation of materials. Among the methods mentioned were the baling of sheet steel scrap, collection of cast iron borings and turnings, recovery of cutting oil and the briquetting of cast iron and steel turnings and borings to get the best market price.

McKnight mentions the use of waste cans in the shop with colored bands to designate different materials. Another real money saver was the salvaging of alloy castings. The placing of identifying marks on pattern equipment and marking the alloy numbers on scrap tickets, permitted rejected castings to be remelted at their own foundry instead of being sold. Monthly salvage statements pay big dividends in many plants. When they show losses in each department in proportion to output, to direct labor, and to materials, they make the shop foreman sit up and take notice.

Quality Control

QUALITY control by sampling probably isn't a new idea. But a scientific way of doing it in mass production is another thing. How it is being done by one of the biggest manufacturers is told in *Automotive Industries*, March 21. Just heard today that another company has worked it out on a continuous conveyor basis. Sounds like another step ahead.

How Many Rejections

BY the way, do you know exactly what your rejects are per operation per machine? Sounds simple, offhand probably very small. Asked a couple of the fellows about this on some high production jobs recently. Checking back about three months, they got some figures not so fit to print, but it certainly helped to stir things. A simple chart showing percentage rejections lot by lot in continuous production, giving a picture of from three to six months is a tool well worth trying. Establish a good average figure and control the variations from it. This sort of check is paying dividends for some pretty big companies.

Many New Developments

MAKERS of machinery, tools, accessories and the like are doing their bit to help turn the "corner" smoothly. Classy new models, lots of improved ones, all aiming for better quality and lower costs. We've noticed it. Taking four pages in our new development section every week. Friends tell us they get a lot of ideas out of this section—what do you say?

Chrome Plating

EVER since L. M. McPharlin of Pierce-Arrow showed that chrome-plated plug gages last about seven times as long as those not plated, lots of people have been sold on chrome-plating for salvage. Now Hirschman, Bureau of Standards, crashes through with some mighty good stuff in his research paper No. 276 just off the press. Thinner coats wear better than heavy ones. "Milky" and "frosty" deposits when lapped seem to last longer than "bright," also lapped. Plated right on steel, different samples showed about the same hardness.

Three National Meetings

THE tide's coming in for production men. 1931 will see three National meetings with the new S.A.E. Production Activity at the helm. And meetings are designed by and for the factory man. Here is an opportunity to swap ideas with some of the best posted men in the game today—don't miss it. Campaign opens with a spring meeting in Milwaukee, May 7 and 8, and the boys up there are all excited about it. Turn out and make it a big success.

That Corrosion Problem

HAVE you a metal rusting problem in your plant? In *Automotive Industries*, Feb. 21, we show just how it can be solved. A while ago we visited one of the finest ball bearing plants in the East and found that they had been doing for some moons the very thing we have visualized. Temperature throughout is controlled by unit heaters. Occasionally when humidity is high, heaters are kept running full blast during summer weather.

Humidity Control

ALONG comes G. E. Poggel, pres., National Humidity Reduction Co., with dope on his "Catchdew" unit for soaking up excess moisture. Recommends it for tool cribs, pattern shops and metal stores rooms. It's a simple contraption; just a long cylinder that you hang up, and has no moving parts.

Calculate Cupola Charges

FOUNDRY men will be interested in an item in Nickel Cast Iron News (the International Nickel Co.), April, 1931, about a new booklet that helps to calculate cupola charges. It claims to prove by calculation, even before a cupola is charged, what the approximate proposition of the charge will be after it is melted down.

Tables show how much to allow for oxidation of manganese and silicon, and amounts of chromium, alloy, etc.—J. G.

Developments in Production and Design Mark the New Briggs All-Steel Bodies

Important accomplishments are:

Economy in blank size and elimination of scrap

Cleaner stampings

Metal repairs and finishing only on the final assembly line

Pneumatic belt sander for metal finishing

Unusual stampings for one-piece underbody and front end cover panel

AN event of real significance in the body-making industry is the recent entry of the Briggs Mfg. Co. in the field of all-steel construction. This year Briggs bodies are distinguished by an all-steel structure, including a massive one-piece underbody and steel doors of unusual design. To place these bodies on a competitive mass production basis, many difficult problems of engineering and die design had to be overcome. Some of these are discussed more in detail later.

Equipment plays a leading part in body making, and in a large measure the success of the new project hinged upon the utilization of their press equipment, particularly the Hamilton three-slide press which was recently installed. Taking advantage of the flexibility and the unusual production methods which this massive machine provides, the press shop organization is producing underbodies and rear quarter panels having some novel features which will be described later. Another phase of the program is the successful development of overhead portable spot welders (Briggs patent). By means of these, the final welding of the entire body structure takes place on an assembly conveyor after the main body parts have been tacked together in master jigs.

Fig. 1—Of particular interest is the framing of the front end and the detail of the wheel house + + + + +

An intimate view of the body interior shown in Fig. 1 gives in fine perspective some of the details of construction of the front end, sides, and the one-piece underbody. Of particular interest is the framing of the front end and the detail of the wheel house, the forward section of which is formed as part of the rear hinge pillar.

One of the finest stampings produced in this press shop (and the press organization is justly proud of it) is the one-piece underbody which runs the full length of the body. A finished stamping just withdrawn from the huge Hamilton press is shown in Fig. 2. The press towers above the other presses in the shop despite the fact that the bed is located in a pit about seven feet below floor level. A major part of the action is located in the foundation space which runs about 22 ft. below the floor of the pit. Fig. 3 shows another view of this press, this time set up for producing rear quarter panels. This shot was taken with the ram at top center to show the detail of the die.

Those concerned with press shop oper-

by Joseph Geschelin

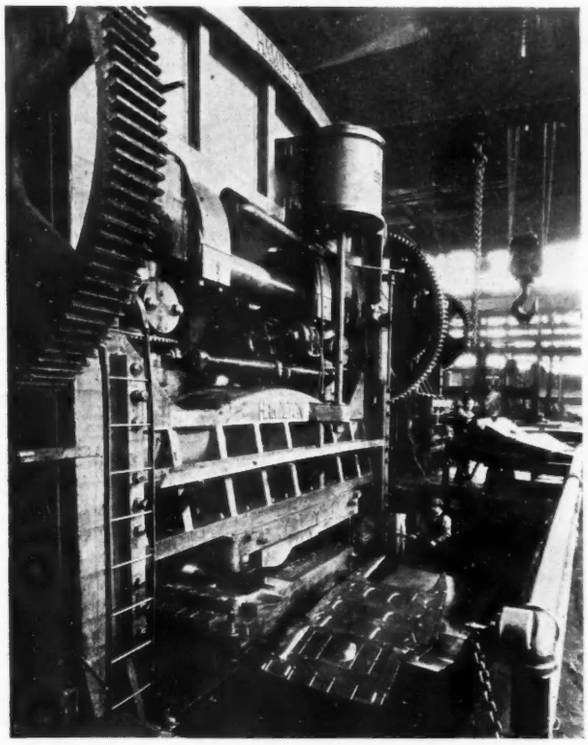


Fig. 2—The one-piece underbody which runs the entire length is here shown being taken from the huge Hamilton press which stamps them out + + + + + + + + +

ations will be interested in the features provided by the three-slide press. First of all, the ram no longer does all the work. The die is so designed that the ram handles all the drawing in one direction while the action from underneath completes the pressing in the opposite direction after the ram has completed its downward stroke. As a result, the blank is much shallower than is customary because no special provision has to be made for reverse draws. To this major saving there is an added economy in the blank due to a smaller draw ring allowance. This follows directly from the fact that the draw ring pressure at any stage is considerably less than usual, although of course the total pressure due to the sum of the downward and upward strokes is about the same.

But there is another important economy which has a lot to do with the decreased final cost of the body. Because the blank is shallower and the draw ring pressure is considerably lower, the final stamping is singularly free from stretcher strain and the usual draw lines. So much so that metal finish generally

Fig. 3—Another view of the Hamilton press, this time set up for production on the rear quarter panels + + + + + + +

has been entirely eliminated and has no place in their production set-up. Whatever finishing touches are required occur at the final assembly line.

Since the saving in metal is one of the ultimate economies, shrewd engineering has produced another saving in the rear quarter panel. To simplify this stamping, the forward part of the wheel house has been incorporated in the rear hinge pillar shown in detail in Fig. 4. At assembly this section is securely welded to the rear quarter to form an integral unit. It might be surmised that the hinge pillar stamping involves some fine die design to produce an accurate alignment of the wheel house as well as a short portion of the bead around it. Some of the unusually deep sections of the pillar, shown in Fig. 4, are particularly well worth noting.

The front end consists of three main stampings, namely, a one-piece cowl panel, a front-end cover panel and the front-end frame. We are told that the front-end frame construction is quite distinctive inasmuch as it is a one-piece U-shaped stamping comprising the two vertical sides and the header. The sides are of deep box section securely welded to the cowl panel, as shown in Fig. 5. Another really fine stamping is the front-end cover panel, which may be seen in part in Fig. 1. This is a massive one-piece A-shaped unit having a deep box section for the vertical sides with a wide header and another transverse section at the cowl. This unit imparts the necessary rigidity to the front end and ties the entire section together into a unit assembly.

For convenience, the main assembly operation on the body frame and dress line are given in the following routing:

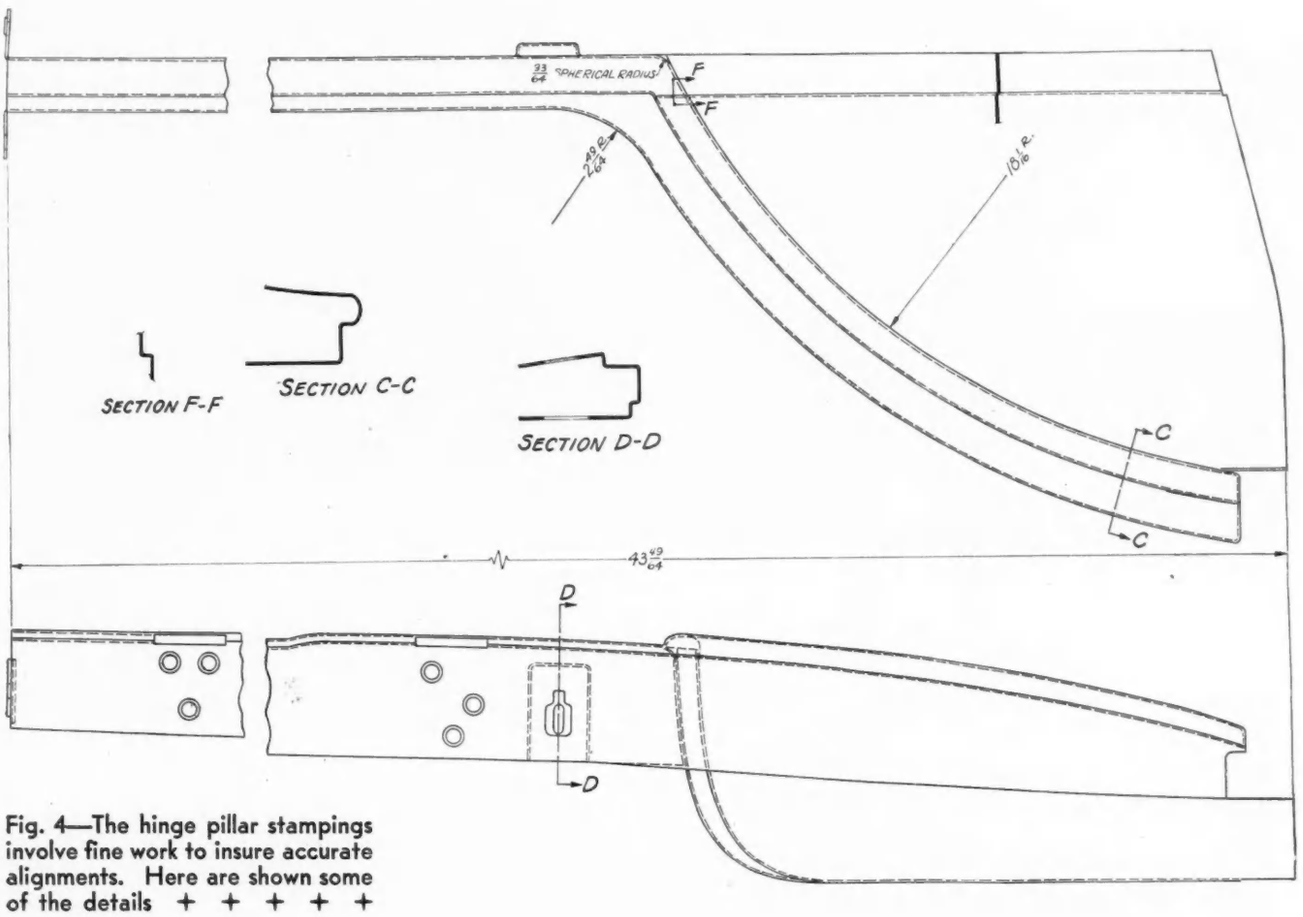


Fig. 4—The hinge pillar stampings involve fine work to insure accurate alignments. Here are shown some of the details + + + + +

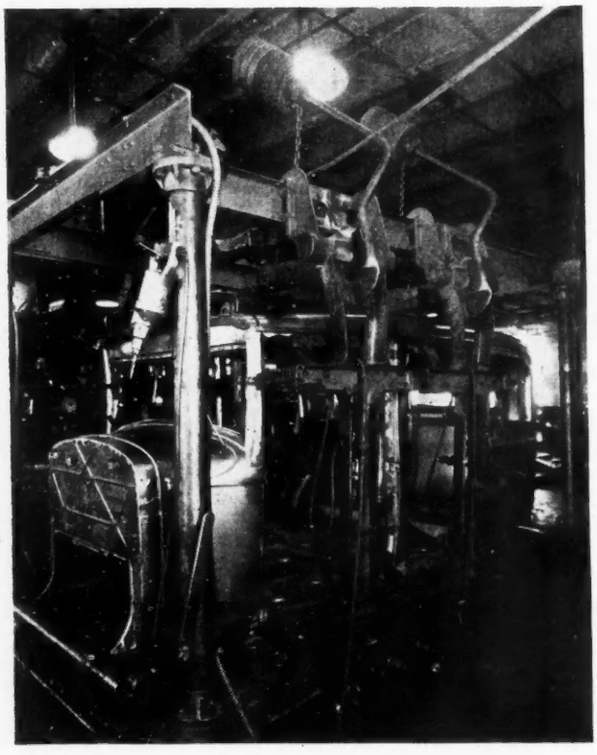


Fig. 5—The front end construction is quite distinctive and is of one U-shaped stamping + + + +

1. Assemble roof to balloon.
2. Slush roof overall.
3. Insert tape across front roof rail.
4. Assemble underbody, front end; balloon in big jig also front header bolts.
5. Assemble front header bolts.
6. Arc weld in big jig.
7. Bar weld in big jig.
8. Insert bolts and tighten on dress line.
9. Assemble wooden sill blocks.
10. Gun weld on dress line; use gages.
11. Arc weld on dress line; use gages and hammer metal flush.
12. Repair.
13. Assemble inside frame to ¼ plrs (top only).

As is evident from this routing, the major assembly operations occur in massive master framing bucks, Fig. 5—one of the outstanding developments in this plant. An unusually clear view of the various elements of the framing buck is afforded by this illustration. The rear section of this fixture, not visible in the photograph, is provided with a short-section bar welder used to unite the rear body panel and the underbody. Certainly there is no question about the accurate alignment of door openings and pillar locations, when it is secured by the huge counter-weighted frames shown in the foreground.

It is well to emphasize that the primary function of this master jig is to provide the permanent alignment of units and for tacking at critical sections. Final welding of the entire structure occurs in the welding department on a special line which they recently in-

stalled. A section of this line is shown in Fig. 6 with the man in the foreground welding the front end by means of one of the new portable spot welders. This view shows up nicely the ease of handling and the accessibility of the welding machine. It is well counter-balanced and suspended from a universal type hanger which permits free movement in all directions. All controls are conveniently located at the welding head.

The familiar type of flash welder is used for making up main sub-assemblies. One of these is the cowl assembly consisting of the cowl panel, front cover, and the front end frame. The other consists of the back panel and the two rear quarter panels. Again there is a departure from the usual procedure in that no metal finishing operations are scheduled at the flash welder. All fins are removed after the body has been completely assembled and is moving through the finishing department.

As mentioned earlier, the present set-up calls for only one metal finishing operation on a special line after all welding operations have been completed. To the practical press shop executive, this will be seen as a decided step forward in manufacturing economy. Clearly it is made possible by improved die design and by the unusual advantages offered by the three-slide press.

A decidedly new feature which we observed in the metal finishing department is a pneumatic belt sander. It is a fairly large unit suspended overhead from a monorail. The abrasive belt if of ample size and covers the large rounded areas with facility. The machine is provided with two substantial handles which give the operator a sure hold and a positive control of pressure against the metal.

Briggs all-steel doors are composed of six individual stampings: an outer cover, an inner cover, and four framing strips. To our mind, one of the most interesting operations in the door plant is the method of uniting the outer and inner panels by crimping the edge of the outer panel. The entire operation of crimping four edges from a flat surface to a complete 180 deg. bend is accomplished in one setting of the press by an ingenious arrangement of the die in the following manner: On the early part of the down stroke of the ram, the edges are turned up 90 deg.; then on the lower end of the cycle, cam-operated horizontal slides come into play and press the vertical edges flat. In all probability this same method may be applied to many similar press problems.

To assure firm anchoring of the body so essential to body silencing, the Briggs body is provided with two large brackets bolted to the dash cover panel as shown in Fig. 5.

Rounding out the general program, the die plant has been equipped with a Marquette die spotting press. This machine was described and illustrated in *Automotive Industries*, May 31, 1930. According to the research engineer, this machine greatly facilitates die spotting work and saves considerable labor. Moreover, it assures absolute accuracy in the die as well as alignment on the press. As a matter of fact, the finished die is used as a criterion of the alignment of the press itself. Accordingly, whenever misalignment is evident, the adjustment is made in the press.

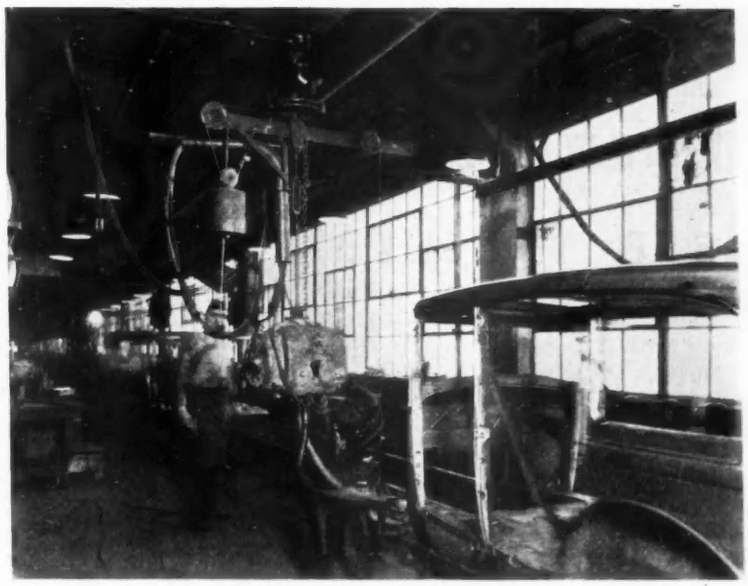


Fig. 6—Final welding of the entire structure occurs in the welding department on a special line + + + + + +

The foregoing gives in a rather brief way some of the outstanding developments connected with the design and production of the Briggs all-steel body. Probably the most important of these are: (1) economy in blank size and elimination of scrap; (2) cleaner stampings free from draw lines; (3) both (1) and (2) made possible by the three-slide principle; (4) elimination of all metal repairs and finishing until the final assembly line; (5) production line welding with the Briggs patented portable arc welder; (6) metal finishing by means of the new pneumatic belt sander; (7) Marquette die spotter for reducing tool room cost; (8) details of unusual stampings such as the one-piece underbody and the front end cover panel.

ACCORDING to Simplified Practice Recommendation R 115-30 just released by the U. S. Department of Commerce, the following practice has been established for 20-ply full disk buffing wheels: Simplified list of diameters, in inches, 4, 5, 6, 7, 8, 11, 13, 14, 17, 18, 20. This standard has been adopted by manufacturers, distributors and users.

SUMMARY of the new products and mechanical improvements of the Evans Auto Loading Co., Detroit, for 1930 embrace the following features, all of which are said to be important in reducing the costs of loading automobiles.

(1) Box corner strap, a one-piece triangular strap to replace the box strapping which formerly was applied al the way around an export case. (2) Steel deck head stamping which supersedes the weaker wood construction formerly used, as well as riser block and flanged head retainer strap. (3) New type of hold-downs which permit the use of two drive screws instead of nails.

THE Bureau of Standards, U. S. Department of Commerce, has issued a publication on Plain and Thread Plug and Ring Gage Blanks (Commercial Standard CS-8-30). Copies can be had from the Superintendent of Documents, Washington, D. C., at 15 cents each.

Turning of Aircraft Manufacturers Is a Natural Swing in the Cycle of

Aeronautic Meeting of the S. A. E. at Detroit Discussed:—

Light Airplanes
Small Powerplants
Autogiro Development
Bearing Load Analysis and Cooling Systems

By Athel F. Denham

LIGHT airplanes, their powerplants, the autogiro, bearing load analysis, the applicability of superchargers, high temperature liquid cooling, detonation, corrosion resistance, spark plugs, flying boat hulls, and a number of other subjects were included in the range of topics represented by papers and discussion at the 19th annual Aeronautic Meeting, Society of Automotive Engineers, Detroit, April 15 to 16.

Perhaps the most interesting single statement made during the meeting was offered by J. H. Geisse, vice-president, Comet Engine Co., who expressed himself as of the opinion that the average individual cannot as yet fly the light airplanes available. In this respect, perhaps, he amplified the statement of Robert Insley, vice-president, Continental Aircraft Engine Co., who, in presenting his paper on "Low-Powered Light Engines," stated that the turning of airplane manufacturers to the light plane this year was largely a natural move in swinging through the cycle. Mr. Insley stated that the major reason for this move was due to the inability of airplane manufacturers to sell recent types to the private owner, and added a warning that unless really serious consideration was given as to what was needed in a light plane, it also would again pass largely out of the picture for the time being.

Mr. Insley felt in this respect that there probably should be two classes of light airplanes, one designed primarily for safety at low cost of operation, and the second requiring the additional factor of good performance. For the former type he suggested a powerplant of around 35 hp., and for the latter around 50 hp., basing his estimate on the necessity of carrying two people.

An interesting suggestion made by Mr. Insley was that for the latter class, the high performance light airplanes, the propeller be driven off the camshaft rather than the crankshaft. The two to one reduction effected would materially increase the tractive efficiency of the propeller, while the added weight that would be necessary, and the somewhat impaired cooling, might not prove serious in this class of ships, with top speeds of around 100 m.p.h.

As Mr. Insley saw the two classes of light planes, he visualized the lower-powered cheaper unit as selling for less than $1,500, while the high performance type would list at from $1,500 to $1,750. The latter, he thought, should be equipped with generator and electric starter, while the engine instrumentation for the former might well be confined to a tachometer and oil pressure gage.

Mr. Insley also felt that the three-cylinder radial or the four-cylinder opposed horizontal had the best future in the light engine class, with the somewhat easier cooling of the three-cylinder offset by the greater smoothness of the four-cylinder type. The two-cylinder he eliminated by pointing out that for safety it should have dual ignition, and that it was also rough. The four-cylinder in line he characterized as too heavy for this horsepower classification.

The two-cycle was also not included in Mr. Insley's possibilities, since he felt that crankcase compression and difficulty in starting were serious drawbacks for this type in small sizes. Mr. Geisse differed on this point with Mr. Insley, stating that his company had developed and was working on a two-cycle engine which starts as easily as a four-cycle. For this type of engine he claimed a smaller jacket loss, but admitted that fuel consumption was rather high at best.

Opinions expressed at the meeting:

Unless serious consideration is given to what is needed in a light plane this type will pass largely out of the picture.

The average individual cannot as yet fly the light airplanes now available.

to Light Planes Development

A highlight of the aircraft session, as it was a highlight of the National Aircraft Show, was the autogiro. W. Lawrence LePage, Kellett Aircraft Corp., started the discussion with a paper entitled "Further Developments of the Autogiro." In this paper he went over the steps that were taken to develop a plane with commercial possibilities from the designs and on the theories of Senor Juan De la Cierva, the inventor of this craft. He pointed out the apparently contradictory requirements of both static and dynamic balance called for in this ship, as long as a vertical landing speed was required of it. The former he said was easily enough obtained through the tail surfaces, although the center of pressure travel is in the opposite direction from that in a standard or conventional airplane, calling for a reversal of tail surface requirements. Mr. LePage claimed that the downwash of the rotor blade provided the necessary controllability in vertical descent. In this statement he did not find entire agreement among the discussers, and the question of whether a completely vertical descent with complete control could be obtained was left rather open to question.

Ralph H. Upson, Professor of Aeronautics, University of Michigan, and a dirigible and airplane designer of note, expressed himself as of the opinion, to which Mr. LePage also subscribed, that vertical landing was not the major advantage of the autogiro, and that it presented greater possibilities in the direction of building higher speed lighter-than-air ships. He referred of course to the high top speed to landing speed ratio of the ship, which is away in excess of that of the conventional airplane, at least with the top speeds obtained to date.

The fixed wing on the present autogiros, Mr. LePage explained, has an important function in high speed operation in that it takes some of the lift off the rotor blades, so that it is possible to virtually design the ship for a constant rotor speed (in r.p.m.) at all speeds of the ship.

Some further statements by Mr. LePage in answer to questions during the discussion might be listed here:

The autogiros cannot glide as "flat" as a conventional airplane since its lift to drag ratio is not as high.

Present autogiros are designed for the inverted load conditions attained at the end of a climb. The considerable inertia of the rotor blades minimizes the slowing down of the rotor under these conditions.

The settling speed of the autogiro is proportional to the disk loading. In present designs this is about 1.6 to 1.65 lb. per sq. ft.

More blades cannot be used for the rotor effectively due to interference between the blades. With a smaller number of blades there is difficulty in articulation. The four-blade design is best compromise at present, although the three-blade design may be better, due to the better mass distribution.

Study of autogiro theories in the form of small models awaits the solution of the question of scale effect on autorotation.

There is no apparent limit to the size of an autogiro. The swept disk area can be increased faster than the diameter. For smaller ships the rotor cannot be made too light, as this would remove the necessary centrifugal force and produce too great a coning angle; 9-10 deg. of coning appears to be correct at present for a maximum figure.

If an autogiro were designed for high top speed, with a landing speed, minimum, of 30 m.p.h., the full disk could be presented to the air for braking, without zooming, due to the inertia of the rotor blades.

No studies have been made yet of the autogiro as to its operation in vertical overload gusts. Believed that the flexibility of the system would help to minimize the effect.

The autogiro is extremely sensitive to weight. It is more susceptible to weight changes than the conventional airplane.

The design of the undercarriage presents a serious problem in the autogiro, since it must have tremendous shock absorbing qualities, without appreciable spread of wheels.

The tilt of the engine in the autogiro is due to the low location of the center of gravity which the center line of thrust should intersect. The position of course causes a loss in efficiency.

It was interesting to note from the paper entitled "High Temperature Liquid-Cooled Engines," by Arthur Nutt, Vice-President of Engineering, Wright Aero-

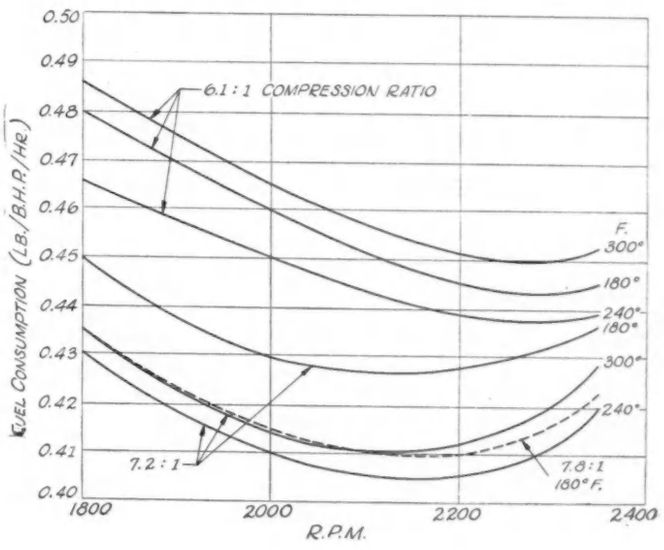


Fig. 1—Effect of cooling, medium temperature on propeller specific fuel consumption with Conqueror engine + + + +

nautical Corp., that the designer of a water-cooled engine now takes the air-cooled engine as a criterion for low weight. In discussing ethylene glycol-cooled engines, Mr. Nutt, for instance, said: "In power units above 600 hp. it appears possible to develop power units which will weigh about 1.5 lb. per hp. including radiator piping and cooling liquid, which is comparable to the large air-cooled units."

Mr. Nutt sees the high temperature liquid-cooled engine as having a definite field in large patrol boats, transport airplanes, various military airplanes and dirigibles, particularly because of their low fuel consumption.

Mr. Nutt's experiments, from which the data in this paper were obtained, were carried out on a Curtiss Conqueror engine, with various compression ratios. With this engine, Mr. Nutt found that 240 deg. was the optimum cooling liquid temperature for minimum fuel consumption, generally. His curves also showed that high cooling liquid temperature produced a more pronounced effect on fuel economy at the higher than at the lower compression ratios. (See Fig. 1.)

Somewhat related to Mr. Nutt's paper was that by Oscar W. Shey, National Advisory Committee for Aeronautics, entitled "Superchargers and Superchargers," in that it showed that the gain through supercharging was more pronounced at the high than at the lower compression ratios. They differed distinctly of course in that Mr. Nutt's experiments were aimed at improvement in fuel consumption with the minimum loss in power, while Mr. Shey's calculations and experiments dealt with how to increase power at altitudes with the minimum loss in fuel consumption.

A conclusion which Mr. Shey drew from his work was that there appears to be no apparent gain beyond a drive ratio of 3 to 1 for the supercharger, since if the unit is driven faster than this, too much power is lost at low altitudes. To offset the loss of power at low altitudes, generally, Mr. Shey suggested a gear change box for the supercharger. Mr. Shey's figures also definitely showed the superiority of the centrifugal blower over the Rootes or Vane type. It was Mr. Shey's opinion, moreover, that there was more to be gained with supercharging in an engine of between 100 and 400 hp. than in larger types, since the effect on weight per horsepower by supercharger additions is more pronounced in this range than higher.

An interesting observation made by Mr. Shey was that boosting at high compression ratios had little effect on exhaust gas temperatures. This he used as a further argument to show the gain by supercharging at high compressions rather than low, arguing that the intensity of the heat is more detrimental to engine reliability than the quantity of heat. From both this, and the horsepower gain viewpoint, he concluded that supercharging an engine of less than 4.5 to 1 compression ratio, anyway, was impractical.

Figs. 2 to 6 show the effect of boosting on brake mean effective pressure, fuel consumption, maximum cylinder pressure, heat loss to jackets, and exhaust gas temperature for various compression ratios, as taken from Mr. Shey's paper.

Bearing Loads Discussed

One of the most comprehensive papers given recently before the society was that on "Bearing Load Analysis and Permissible Loads," by Ford L. Prescott and Roy B. Poole, Material Division, U.S.A. Air Corps. In addition to reviewing previously published data on this subject, the authors presented a method of readily obtaining, analytically or graphically, approximate bearing loads in a radial engine. The authors pointed out in this paper that aircraft engines reach bearing loadings of as high as 207,000 lb.-ft. per sec., in full power dives, comparing this with the 40,000 pv. factors which represent the permissible border line apparently in automobile engine design.

This point brought about some discussion, naturally. Dr. H. C. Dickinson of the Bureau of Standards objected to the use of the "pv. factor" as a criterion of bearing loading, claiming that the relation was the ratio of pressure to velocity rather than the product of the two. A. F. Denham of *Automotive Industries*

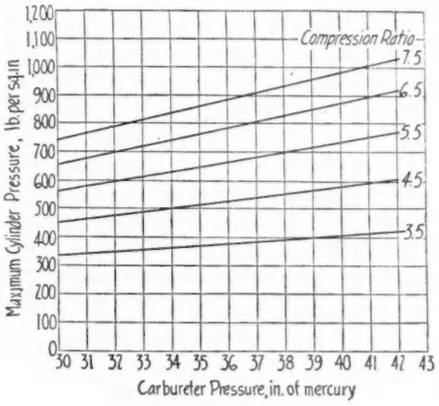


Fig. 4 (right)—Effect of boosting, at different compression ratios, on maximum cylinder pressures + + + + +

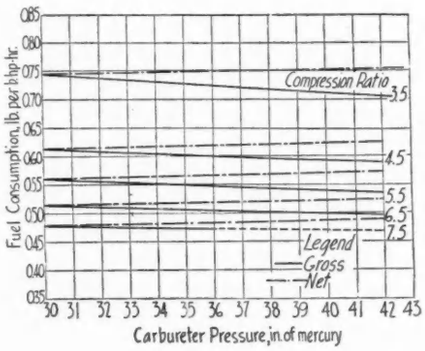


Fig. 3 (above)—Effect of boosting, at different compression ratios, on fuel consumption + +

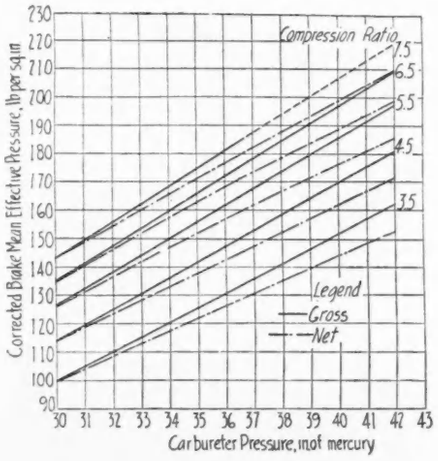


Fig. 2 (left)—Effect of boosting, at different compression ratios, on brake mean effective pressure +

Fig. 6 (right)—Effect of boosting, at different compression ratios, on exhaust gas temperatures

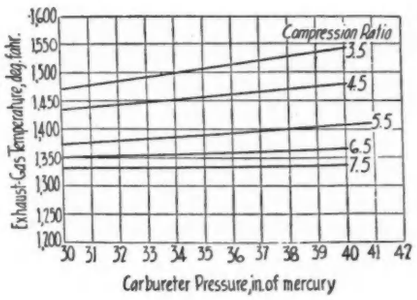
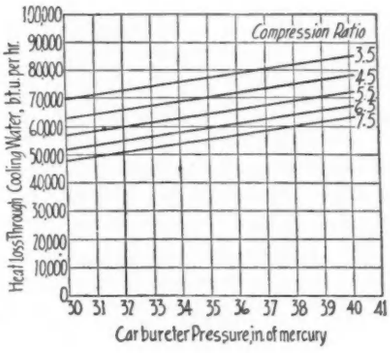


Fig. 5 (below)—Effect of boosting, at different compression ratios, on heat losses to the cooling water + + + + +



stated that such a ratio presumed the presence of continuous film lubrication, which apparently was not necessarily the case and that the lubricating oil temperature rise in an automobile engine with increasing "pv. factor" made this factor of primary importance, since oil temperature reached in operation at present seemed to be limiting the permissible bearing loadings.

Dr. Dickinson agreed that "pv. factor" had an important bearing on oil temperature, but stated that continuous oil film lubrication was maintained in bearings. Dr. Dickinson further added that the use of the "pv. factor" as a criterion for bearing loads had been discarded by other industries years ago.

The matter seems to be one that certainly deserves further discussion and possibly experimentation. Whether or not the theories applicable to other types of bearings hold in the case of the automotive powerplant can be determined only by experiments. Certainly the short duration of power dives to which an airplane is subjected does not, alone, seem to be a proof that the same high bearing loads can be obtained in an automobile engine, especially in view of the vastly lower oil temperatures due largely to permissible oil flow prevalent in aircraft as against automobile engines in hard service. Recent experiences of automobile manufacturers who have had to turn to oil coolers to safeguard bearing life is a case in point.

Other papers presented at the session included:

Commercial Flight Testing, by E. W. Rounds, Bureau of Aeronautics.

Fabrics in Aeronautics, C. J. Cleary, U. S. Army Air Corps.

Applied Load Factors and Their Correlation With the Load Distribution, by R. V. Rhode, National Advisory Committee for Aeronautics.

Spark Plugs for Aircraft, by G. M. Paulson, B. G. Corp.

A Novel Method of Studying Flying Boat Hull Models, by Igor Sikorsky, Sikorsky Aviation Corp.

Corrosion Prevention, by Lessiter Milburn, Glenn L. Martin Co.

Detonation Tests on Aviation Fuels, H. K. Cummings and D. B. Brooks, Bureau of Standards.

Precision of High Temperature Knock Testing, by Dr. Graham Edgar, Ethyl Gasoline Corp.

Engine Data on Cooperative Aviation Fuels, W. A. Parkins, Pratt & Whitney Aircraft Co.

Airplane Fuel Line Temperatures, by O. C. Bridgeman, Bureau of Standards.

J. C. Hunsaker, vice-president, Goodyear Zeppelin Co., and "Senator" Edward Ford were the speakers at the Aircraft Banquet, with Hon. W. P. MacCracken as toastmaster. The various sessions of the S.A.E. were held in conjunction with the Aeronautical Chamber of Commerce, and were marked for the attendance of major executives of many airplane and engine companies.

Two Nominating Committees were elected at the sessions. The first, to nominate a vice-president representing the aircraft activity of the society, consisted of W. L. LePage; Ralph Upson; George Hallett, General Motors Research, and C. H. Chatfield, United Aircraft. The second, to nominate a vice-president representing the aircraft engine activity, consists of Burnham Adams, Curtiss-Wright Corp.; G. C. Brown, Bohn Aluminum; F. C. Shoemaker, General Motors Research, and A. L. Beall, of Vacuum Oil Co.

Rules of the International Grand Prix, 1931

1. The Automobile Clubs of France, Italy, Spain and Belgium agree to organize in 1931 at each of them a Grand Prix of speed without any specification of engine, all of them under the same rules.

2. These races will be in France at Montlhery, June 21. In Belgium at Spa Francorchamps, July 12. In Italy at Monza, Sept. 6, and in Spain at San Sabastian, Oct. 4. Each of these races will last 10 hr.

3. The four races have a general classification to which is affected as prizes a total of 400,000 French francs. The distribution of that total will be as follows:

1st—150,000	3rd— 75,000
2nd—100,000	4th— 50,000
5th— 25,000	

4. For the general classification of the four races it is given at each of those races:

1 point of the first, 2 of the second, 3 of the third, 4 of the fourth and all the following if they have made at least three-quarters of the distance made by the first.

5 points to the competitor after the fifth who have made half the distance of the first.

6 points to the competitors having made a quarter of the distance of the first.

8 points to the competitors who have not started in the race.

The general class is made by the total of the points every competitor had in the four races, the first being the one who had the smallest total of points.

5. For every car entry in the race one principal driver must be indicated and that one will be considered as the competitor with the car on which he started.

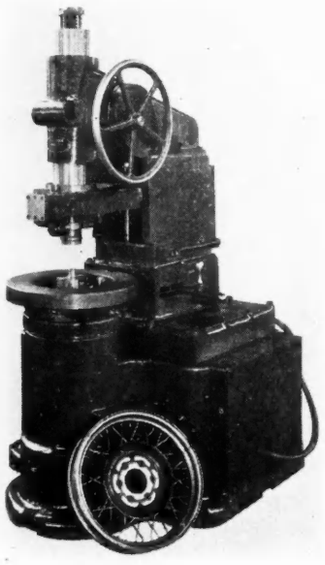
6. If a principal driver did not drive a car of the same make in the four races, he will be penalized eight extra points for each change of make.

NEW DEVELOPMENTS—AUTOMOTIVE

Ex-Cell-O Semi-Automatic Machine for Wire Wheels

A SEMI-AUTOMATIC machine for boring and turning two diameters, forming two peripheries and facing the hub face on the wire wheel and the hub of steel wheels has been designed by the Ex-Cell-O Aircraft & Tool Corp., Detroit, Mich.

The following operations give the floor-to-floor cycle. The wheel is placed on the rotating table and is centered by a shouldered pilot in the upper vertical unit. This unit is fed downward by means of a rapid traverse through a large manually operated hand wheel at the top of the machine, to an indicated stop, and locked in that position. The pilot is mounted on ball bearings and is backed up by a heavy spring at the top so that any desired pressure can be exerted for holding the wheel in place. The stop consists of a roller which rides on the hub of the wheel proper and enables the operator to set the cross slide, which is carried on the upper vertical unit for removing the minimum amount of stock.



With the upper vertical unit in this position, the feed is thrown in by means of a hand lever shown in the center of the machine proper. The cross slide then finishes the hub face and forms the radius on the periphery of the hub flange.

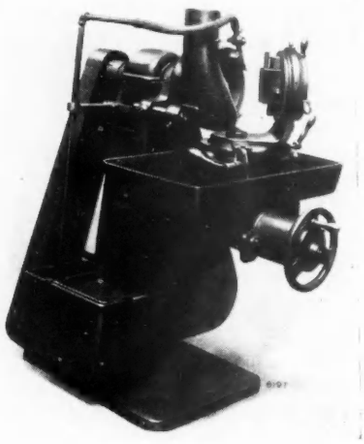
Simultaneously with this operation the lower vertical unit is automatically fed up, and bores the opposite end of the hub with a circular form tool. This lower unit travels upward until the boring is completed, at which time a roller comes in contact with the lower face of the hub. This roller follows the run out of the hub and keeps the chamfering tool that is automatically fed horizontally at this point, true with the lower face of the hub, thereby insuring a symmetrical chamfer.

When the chamfer is completed the lower unit comes to rest at the downward end of its stroke and the upper unit is released and fed upward to the end of its stroke, then the wheel is removed from the machine. The floor-to-floor time for the above operations is approximately 65 to 70 wheels per hour.

Gisholt Tool Grinder

SEVERAL improvements in the Universal Tool Grinder have been announced by the Gisholt Machine Co., Madison, Wis. These features adapt the machine to use on cemented-tungsten-carbide tools without sacrifice of efficiency on high speed or super high speed steels.

Since the nature of tungsten carbide tools necessitates a light, even pressure against the grinding wheel, the spindle has been redesigned to incorporate a spring cushion ball thrust bearing. Excessive pressure against the face of the cup wheel cannot be exerted since the wheel is held against the tool by spring pressure only. If tools other than tungsten carbide are being ground, this cushioning device may be locked so that heavy cuts may be taken.



The design of the wheel mount is such that the removal and replacement of different types of wheels for different materials may be accomplished rapidly.

The construction at the wheel end of the spindle is of the labyrinth type to protect the bearings from tungsten carbide dust. Oil gages have been added to both front and rear bearings.

The new wheel guard is of heavier construction and may be directly connected to overhead dust collection systems.

This grinder is intended primarily for grinding singe-point cutting tools for turret lathes, engine lathes, shapers, planers, slotters, boring mills, etc., of either the inserted cutter or solid forged type.

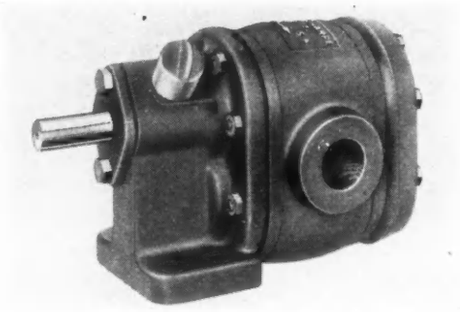
B & S No. 55 Rotary Geared Pump

A NEW No. 55 Rotary Geared Pump with ball bearings and spiral gears is announced by the Brown & Sharpe Mfg. Co. of Providence, R. I., to replace the No. 5 Pump previously manu-

PARTS, ACCESSORIES AND PRODUCTION TOOLS

factured by this company, which is withdrawn from its line.

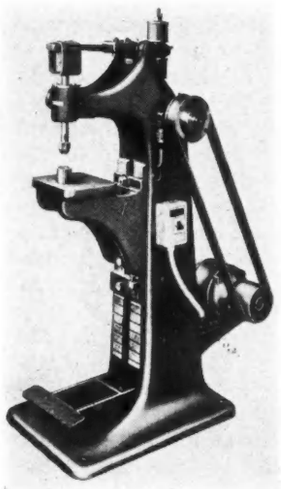
A number of improvements have been incorporated in the design and construction of the new pump which make it particularly desirable for use in supplying oil under pressure for hydraulic operation of machines. The cap, stand and housing of the pump are appreciably reinforced by having been made considerably heavier. To still further strengthen the pumps, two more bolts have been added. This increases the clamping



effect by 30 per cent and permits the use of high pressures without danger of blowing the gaskets. Design of the discharge port has incorporated changes which tend to minimize the load on the bearings, thus increasing the life of the pump.

This pump, running at from 300 to 1200 r.p.m., is capable of delivering from nine to thirty-six gallons of oil per minute at zero pressure, and, at 1200 r.p.m., delivers approximately thirty-six gallons per minute at 100 lb. pressure.

Grant No. 4A Riveting Hammer

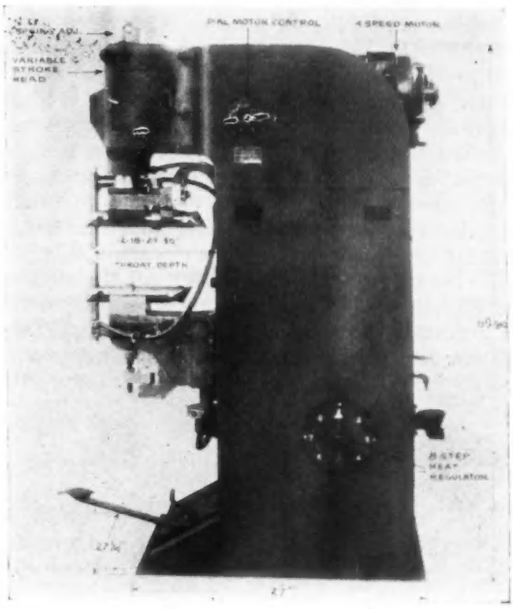


FILLING the need for cold heading rivets 3/8 to 1/2 in. diameter, the No. 4 riveting hammer has been added by the Grant Mfg. & Machine Co., Bridgeport, Conn. This machine is similar in design to the No. 5A, which was described in *Automotive Industries*. Motor capacity is 2 hp. at 1750 r.p.m. A smaller model, No. 3A, with a capacity of 3/16 to 5/16 in., is also available. This will give 1400, 1750 and 2000 blows per min. It is equipped with a 1-hp. motor, 1750 r.p.m.

Federal Spot and Projection Welder

FLEXIBLE control and a decrease of almost 1500 lb. in weight due to the use of welded structural steel are features of the Federal Senior No. 2, spot and projection welder just announced by the Federal Machine & Welder Co., Warren, Ohio. This machine has a variable stroke head which may be of maximum stroke for heavy material or minimum stroke for light material.

A hand dial motor control governs the four-speed motor and gives the four speeds or a stop



position. An eight-position rheostat giving 60 per cent variation in eight equal steps is within reach of the operator at the lower side of the machine. An adjustable knee with special universal horns may be swung at any angle or into any position. The foot pedal is adjustable for length and may be swung right or left and locked to suit the operator.

Imperial Air Cleaner

IN the design of the new United Imperial air cleaner, announced by the United Air Cleaner Corp. of Chicago, account was taken of the various requirements made of air cleaners in automotive service, including high efficiency throughout the range of engine operation, low restriction, freedom from tendency to become choked, and independence of weather conditions.

The United Imperial cleaner is an oil cleaner, but differs from others of this type in the principle employed, which consists in raising continuous screens of oil by means of power taken from the exhaust. The action therefore is not

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools

dependent on the air velocity mixing the air and oil. As soon as the engine starts, exhaust gas is led into the lower chamber immediately below the oil level, and a curtain of oil or oil spray is raised into the air stream. All of the air entering the carburetor is compelled to pass first through this oil spray, and it is then carried through a chamber containing kinked wire, where practically all of the dust still remaining in it is removed. Tests are said to have shown an efficiency of more than 99 per cent, and that with but little restriction on the air flow.

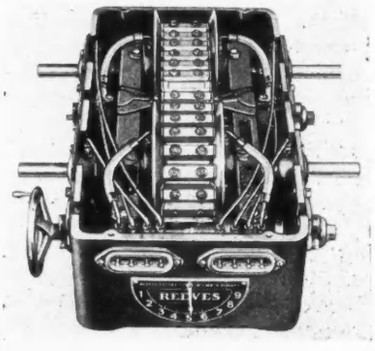
Dirt taken out by the primary cleansing settles at the bottom of the oil reservoir provided at the bottom of the cleaner. The upper chamber, containing the loosely packed kinked wire, is provided with drain-backs which are not in the path of lowest depression. Through these drain-backs the oil, together with the slight amount of dirt not caught in the primary cleansing, passes to the reservoir below. The chamber of kinked wire also serves to separate the oil from the air particles before they pass to the carburetor.

The constant circulation of hot oil through the wire filter is said to make the filter self-cleansing, and to make it capable of continuous operation without servicing. The cleaner has no moving parts.

Enclosed Design Reeves Transmission

THE enclosed design variable speed transmission, recently announced by the Reeves Pulley Co., Columbus, Ind., embodies some radical improvements over previous Reeves units. In this new unit, the standard internal operating parts are totally enclosed in a compact, cast-iron case which affords complete protection in all applications where the operating parts of the transmission must be guarded from water, live steam, chemical fumes or abrasives.

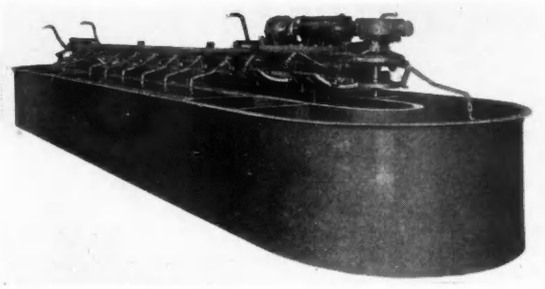
Easy access to operating parts is provided by U-shaped recesses in the sides of the bottom section of the case which permit the removal, as a unit, of the operating parts, including the bearings of the two shafts as well as the shifting and belt-tightening screws. Removal of the lid from the cover section permits minor adjustments, inspection of the internal operating parts, or inspection of the internal operating parts, or installation of a new V-belt.



Complete lubrication of all bearings is accomplished through force feed fittings, located in two recessed panels at one end. From these eight fittings rigid copper tubes lead to the four radial shaft bearings and flexible copper tubes lead to the four thrust bearings fitted around the disk hubs. By means of openings from the thrust bearings, the lubricant is also forced into the spiral grooves of the disk hub bores, thus thoroughly lubricating the disk hubs, shafts and driving keys.

Stevens Return Type Automatic Plating Machine

ACCORDING to a recent announcement by Frederic B. Stevens, Inc., Detroit, Mich., one of their latest plating machines of the Universal return type has been installed at the Mansfield (Ohio) plant of the Westinghouse Electric & Mfg. Co. Clearly, the outstanding feature of this equipment is the use of a horizontal conveyor chain with pivoted carrier arms. Transfer units, acting as cams, shown at the ends of the machine, lift the carrier arms at the end of their travel, thus raising the work out of the tank. As the arms reach the other side they drop down, lowering the work into the next tank.

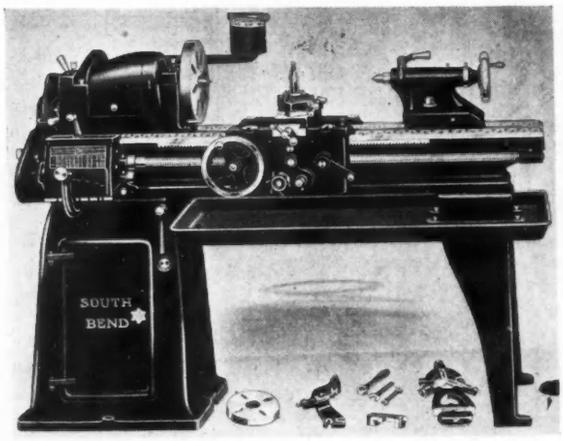


While the work is lowered in the plating tank, or any tank where electrical current is required, a contact is made between the contact bracket of the carrier arm and the bus bar. This contact is broken as the work is being raised from the tank. One of the important advantages claimed for this machine is in chromium plating. To properly chromium plate irregularly shaped pieces, especially those with depressions, special anodes must be used to properly throw the current into these depressions and obtain proper deposit. In full automatic plating machines this is obviously impossible unless special provision is made for this anode grouping. In this machine the carrier arms are equipped with both anodic and cathodic contacts, so that both the specially designed anodes and the work are carried on the same carrier arm. The machine is universal in that any kind of plating or cleaning operations may be handled. Tanks requiring ventilation can readily be equipped with side exhaust hoods to carry off noxious fumes.

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools

South Bend Back-Geared Precision Lathe

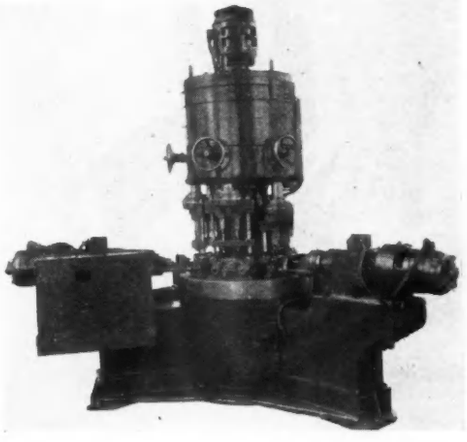
A BACK-geared, screw-cutting precision lathe, featuring the underneath belt drive, with power unit and motor inclosed in a cabinet leg under the headstock, has been added by the South Bend Lathe Works, South Bend, Ind. It is designed for production; fine precision work in



the tool room, and general machine shop work. This line, known as the Series "N" Underneath Belt Motor Driven Lathes, is built in sizes from 9 in. to 18 in. swing, and in various bed lengths from 2½ ft. to 14 ft.

Automatic Machine for Drilling, Reaming and Tapping

A NEW vertical automatic unit with three auxiliary horizontal units that were required to drill, ream and tap a horizontal hole in a bronze part was recently designed by the Ex-Cell-O Aircraft & Tool Corp., Detroit, Mich. The vertical spindles are contained in a single unit in the upper portion of the machine proper and are driven by one motor through interchange-



able feed cams. The speeds of these spindles may be changed by pick-off gears to suit the individual job and can be made adaptable to either multiple head mounting or single spindle.

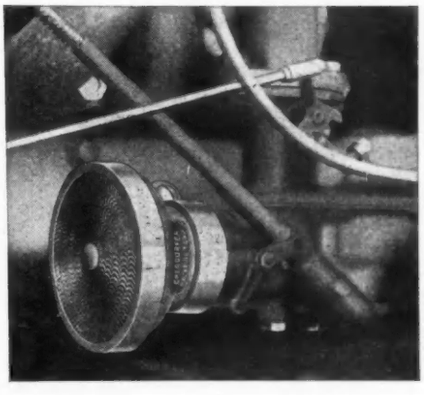
On the machine shown here all the units are equipped with multiple heads. The heads provide from two to four spindles each, depending upon the operation to be done. Each of these multiple heads is equipped with spring guide bars and bushing plates. The guide bars not only carry the bushing plates but also insure a rigid alignment between the drill head and the fixture as the work is indexed from one station to another.

This machine is furnished with a five station rotary table carrying suitable fixtures for holding the parts during the various operations, one loading, and the remaining four work stations. Each fixture holds two parts. There are four operations performed by the vertical units and three by the horizontal units. The vertical operations consist of drilling, reaming and tapping a 15/16 in. hole and drilling only three 13/64 in. holes in the flange of the part. The three horizontal units, of which two are shown in the photograph, are for drilling, reaming and tapping the ½ in. hole which is at right angles to the large diameter of the part.

By one station being provided for loading, the operator loads two parts, clamping them in place by a simple clamping method while the other units are in operation.

Oberdorfer Back-fire Trap

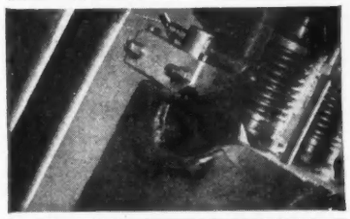
A NEW design of back-fire trap, known as the Model B, has been placed in production by the M. L. Oberdorfer Brass Co., Syracuse, N. Y. The illustration herewith shows the device applied to the air horn of the carburetor on the Ford



Model A car. It is made of non-corrosive metals, the end consisting of alternating windings of straight and flat metal. Besides preventing carburetor fires due to backfiring, the device is said to have an air-cleaning effect.

Automotive Oddities—By Pete Keenan

NO SMOKING
VINCENT SCAPPATICO RECEIVED FOUR SUMMONSES IN AS MANY MINUTES WHILE HIS CAR WAS MOTIONLESS ONE FOR RECKLESS DRIVING
New York Dec 23rd 1930
THE FIRST SERVICE STATION IN THE U.S.A
was in Seattle, early in 1907. Only one car could be served at a time. (Standard Oil Co., of California)
MOTOR SKATES!
Exhibited at the French Auto Show 1905. The gas tank was carried on the back.
Suggested by R.W.A. Brewer.
A HORSE'S FEET DO SIX TIMES MORE DAMAGE THAN A CAR TO A ROAD.
Pete Keeney
PERFECT MODEL OF "CATERPILLAR"
Drew the attention of King Alfonso for nearly half an hour at World's Fair Seville, Spain. It took six months to build and cost $2,500. Built by Pliny Holt Stockton, Calif.,



NEWS OF THE INDUSTRY

Air Craft Show Sales are Good

Seventeen Manufacturers Report Business Booked

DETROIT, April 23 — Official National Aircraft Show figures from Ray Cooper give 81,000 paid admissions; total attendance was over 90,000. Sales as reported by 17 airplane manufacturers of 41 which exhibited totaled $1,652,751, representing sales of 636 airplanes. Traffic at the Municipal Airport during the week showed 11,135 takeoffs and landings on runways.

Sightseeing operators collected $14,568 from 5384 passengers. Light planes represented a major part of the sales, totaling over 500. Buhl Aircraft Co. reported orders for 271 Bull Pups. Pitcairn sold 38 autogiros.

Briggs Profits Up

DETROIT, April 24 — Briggs Mfg. Co. reports net income for the year 1930 of $4,035,912, or $2.01 a share, on capital stock. This compares with earnings of $2,426,609, or $1.21 a share, in 1929. Earnings for the first quarter of the current year are given at $208,830, as against $155,797 in the first quarter of 1930.

Eaton Reports Profit

DETROIT, April 24 — Eaton Axle & Spring Co. and subsidiaries report net income for the first quarter of the current year of $217,373 after all charges. This is equivalent after dividends on Wilcox-Rich Corp. Class A stock to 30 cents a share on Eaton Axle common stock.

Hupp Reports Loss

DETROIT, April 22—Hupp Motor Car Corp. reports net loss for the three months ended March 31 of $680,911 after all charges. This compares with profit for the corresponding period of last year of $66,749.

A J. SCAIFE, field engineer, the White Co., was in Phila. this week, and visited us *** the New Ford water tunnel will begin to spurt gallons next week *** Frank Fageol of Twin Coach is looking for an 1899 Stanley Steamer bus, similar to the one he operated himself . . . the photo he sends looks more like a Mobile or Locomobile of those days . . . not that we ever saw one of 'em *** there will be a new low-priced six on the market about May 15 . . . the manufacturer is mentioned in the news section following *** That there are only about 20 toll roads remaining in the U.S., with a total mileage of 150, and that many of these offer scenic or time-saving advantages for the tariff collected, are findings of H. H. Kelly, who publishes an article on Toll Roads in the current issue of "Public Roads," the official publication of the U. S. Bureau of Public Roads. Mr. Kelly (who is well known to the automotive industry, and who is now connected with the Highway Transport Division of the Bureau of Public Roads) reviews the history and progress of the toll road principle throughout the world. There are some very interesting illustrations of historic toll gates appearing in the article *** the American Road Builders Assn. has issued invitations for its President's Dinner in Washington, May 15 *** President Hoover presented the Collier Trophy to Harold Pitcairn on Wed., April 22 . . . an Autogiro landed on the south lawn of the White House to attend the ceremony . . . other Collier Trophy winners present were Orville Wright, who received the award in 1913, Charles Lawrence (1927), Grover C. Loening (1921), and W. S. Burgess (1915) *** the "mystery" parking ordinance which was entered in Baltimore City Council because one of the learned legislators had "found it on his desk" has been withdrawn because the same l.l. "received a note asking him to withdraw it" . . . that's what we call the apotheosis of a yes-man *** a bale of cotton auctioned off at a recent cotton festival in Memphis was used to make a set of Goodrich tires, which were then returned to Memphis and sold for charity *** Margery Durant, daughter of W. C., sailed on the 22nd for Hamburg, with a Lockheed Vega in which she plans an air tour of Europe and the Mediterranean *** five companies now reserve air passenger seats in a Postal Tel hookup *** a Stutz standard job has been entered in the May 30 business at Indianapolis . . . L. L. Corum will drive . . . he started the car with which the late Joe Boyer won the 1924 event *** fresh eggs are being sent to New York markets by truck from Iowa . . . we don't see any demand in N. Y. for fresh eggs at the moment. * * * all of which is reported by . . . Herbert Hosking.

THE NEWS TRAILER

Plan a Lubrication Engineering Session

Will Meet at State College, May 22

STATE COLLEGE, PA., April 23—A lubrication engineering meeting, under the joint auspices of the Pennsylvania State College and the Lubrication Engineering Committee of the American Society of Mechanical Engineers, will be held here May 22, according to F. G. Hechler, professor of engineering research at the college.

At the morning session, a paper on Lubricant Testing will be presented by E. G. Boden, engineer, and O. L. Maag, oil chemist, of the Timken Roller Bearing Co. At the afternoon session a symposium will be held on the effect on internal combustion engine lubrication of Coastal Crudes, Pennsylvania Crudes and Midcontinent Crudes. Papers will be presented by A. Ludlow Clayden, Sun Oil Co.; C. M. Larson, Sinclair Refining Co., and E. R. Lederer, Texas Pacific Coal and Iron Co.

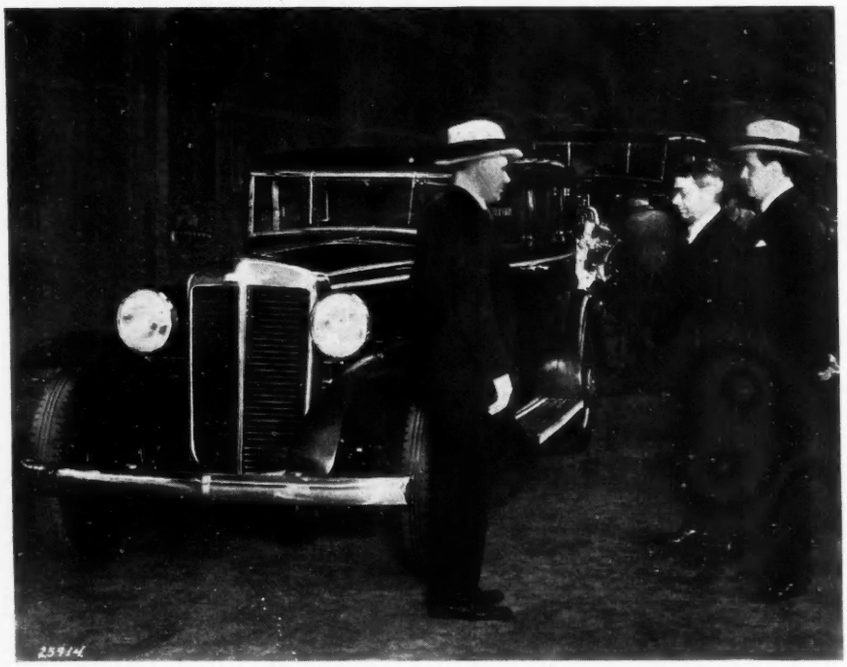
Aero Exports Valued

WASHINGTON, April 24—Exports of aircraft during the months of February numbered seven, valued at $68,768, according to the Bureau of Foreign and Domestic Commerce. Engines exported during the month numbered 15, with a value of $74,676, and exports of parts and accessories were valued at $154,205, according to the report.

Cites New Legislation

NEW YORK, April 22—Among the laws enacted by state legislatures which have been meeting during the winter and spring, but which have now adjourned, are a number affecting the weight and size limits on commercial vehicles. Many of these are found by the Motor Vehicle Conference Committee to be pernicious in one respect or another.

Ready to Drive, Mr. Williams



The first of the 16-cylinder cars to come off the regular production lines of the Marmon Motor Car Co., Indianapolis, is shown being presented to G. M. Williams, president of the company

Rolls Profits Drop

LONDON, April 10 (*By Mail*)—Reports of the Rolls-Royce Co. issued today relating to the 12 months ending Dec. 31, show a net profit of £144,170, which compares with £201,706 for the 14 months to the end of 1929 included in the previous accounts. Pro rata, the 1930 figures represent a reduction of approximately £28,000. The directors propose, however, to pay the same dividend, viz., 8 per cent and a bonus of 2 per cent.

In addition they propose to transfer £20,000 to income tax reserve (against £35,000 last year) £15,723 to general reserve fund (against £40,000), £30,000 to pension fund (same), and carry forward £65,148 (against £66,076).

World Bestos Gains

PATERSON, N. J., April 23—World Bestos Corp. reports that its business with automobile manufacturers was 26 per cent greater during the first half of April than its total March sales. Business with jobbers, the company states, in the same half month was 67 per cent greater than all March jobber business.

Summarizes Tractor Tests

PHILADELPHIA, April 22—Bulletin No. 255 of the University of Nebraska College of Agriculture, entitled Nebraska Tractor Tests, 1920-1930, has been issued recently and contains summaries of the results of tests made on 64 tractors. It includes data on all tractors that were reported by their manufacturers as still on the market on Jan. 1, 1931. During the 11 years the Nebraska law calling for official tests of tractors offered for sale in that state has been in force, tests have been carried out on 176 tractors.

Army Tests Engines

PHILADELPHIA, April 22—After tests at Wright Field, Dayton, Ohio, of powerplants suitable for army training purposes, a contract has been awarded to Continental Aircraft Engine Co., Detroit, for 12 of its Model A70 second series engines. This is a seven-cylinder radial engine, rated at 165 hp. at 2000 r.p.m. under approved Type Certificate No. 32. An army inspector is stationed at the Continental plant, and delivery of the engines is in progress. These engines will be installed in Consolidated, Verville and Stearman training planes, to be used in army field service this summer.

Propose Hangar Fire Code

BOSTON, April 23—Measures to reduce the increasing fire loss of the aviation industry, which in the last three years has averaged more than $1,000,000 a year from hangar fires alone, will be outlined by the Aviation Committee of the National Fire Protection Association at the 35th annual meeting of the association in Toronto, May 11-14.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, April 22—Industrial activity, as well as wholesale and jobbing trade, declined last week. However, there was a noticeable improvement in retail trade; and collections were more prompt. Reports of the winter wheat crop are generally favorable, but the spring wheat sections in the Northwest have suffered from the drought.

MARCH EMPLOYMENT

An estimate prepared by the Bureau of Labor Statistics, based on reports from more than 13,000 manufacturing establishments and on census reports, indicates that there were 152,000 more persons employed in March than in January, while the aggregate weekly payroll of workers increased by $13,500,000.

CONSTRUCTION AWARDS

Construction contracts awarded in 37 Eastern States during March, according to the F. W. Dodge Corporation, amounted to $369,981,300, as against $235,405,100 during the preceding month.

CAR LOADINGS

Railway freight loadings during the week ended April 4 totaled 728,511 cars, which marks a decrease of 179,548 cars below those a year ago and a decrease of 229,714 cars below those two years ago.

COTTON CONSUMPTION

Cotton consumed during March amounted to 553,357 bales, including linters, as against 486,597 bales during the preceding month and 572,046 bales a year ago.

CRUDE OIL OUTPUT

Average daily crude oil production for the week ended April 11 amounted to 2,308,250 bbl. as against 2,252,100 bbl. for the preceding week and 2,561,250 bbl. a year ago.

FOOD PRICE INDEX

The index of retail food prices on March 15 stood at 126.4, based on 1913 as 100, as against 127.0 a month earlier and 150.1 a year earlier.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended April 18 stood at 74.6, as against 75.2 the week before and 75.3 two weeks before.

BANKS DEBITS

Bank debits to individual accounts outside of New York City during the week ended April 15 were 20 per cent below those a year ago.

STOCK MARKET

The stock market last week continued to decline under the influence of an accumulation of bearish reports. There was no pronounced selling pressure, but buying orders were very slack. The volume of trading was moderate but increased slightly as the week progressed. Practically all issues suffered net losses for the week.

BROKERS' LOANS

Brokers' loans in New York City during the week ended April 15 increased $27,000,000, after a total contraction of $91,000,000 in the three weeks preceding.

RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended April 15 showed decreases of $11,000,000 in holdings of discounted bills and of $40,000,000 in holdings of bills bought in the open market, while holdings of Government securities remained unchanged. The reserve ratio on April 15 stood at 84.6 per cent, as against 83.8 per cent a week earlier and 83.5 per cent two weeks earlier.

A.S.T.M. to Hold Equipment Exhibit

All Phases of Testing Work Will be Represented in June 22-26 Show

CHICAGO, April 20—For the first time in its history, the American Society for Testing Materials will sponsor an exhibit of testing apparatus and machines in conjunction with the annual meeting of the society in Chicago June 22-26 at the Stevens Hotel.

The exhibit is limited to equipment and apparatus used in the testing of materials and products and recording and control equipment which is used in testing will be shown. Testing machines of all types, metallographic and optical equipment, certain chemical and physical testing equipment and specialties.

French Aero Exports Drop

WASHINGTON, April 21—France's foreign trade in aircraft registered a decline during 1930, both in exports and imports, as compared with the previous year, according to French trade statistics received in the Commerce Department from Trade Commissioner W. L. Finger at Paris.

Exports during the year amounted to approximately $8,279,000, as compared with $8,405,000 in 1929. The 1929 total, however, was about 53 per cent above 1928, so that relatively the past year's exports are considered to have been well maintained. Imports of aircraft and parts amounted to about $100,744, as compared with $136,416 in 1929, most of the imports being for experimental purposes.

Krone-Sebek Merges

CHICAGO, April 20—Autodraulic Corp. has merged with Krone-Sebek Die Casting & Mfg. Co. The business, plant, equipment and patents of Autodraulic Corp. are taken over. Krone-Sebek facilities will be employed to start quantity production of the Autodraulic Jack at an early date.

Explains Rumely Merger

CHICAGO, April 20—The proposed transaction of Allis-Chalmers Mfg. Co. with Advance-Rumely Corp. involves purchase of certain of Rumely's assets, including its good will, but does not include the acquisition of any Rumely stock, Max W. Babb, vice-president and general attorney of Allis-Chalmers, announces.

Form New Company

TOLEDO, April 22—Acme Steel Blanking Co., Inc., was formed here today to occupy part of old Bock Bearing Co. plant and make steel blanks.

Cliff Knoble

WHOSE APPOINTMENT AS DIRECTOR OF ADVERTISING OF THE CHRYSLER SALES CORP. WAS ANNOUNCED IN *AUTOMOTIVE INDUSTRIES* LAST WEEK

New Standards Approved

PHILADELPHIA, April 20—According to the recently issued Standards Yearbook for 1931 of the American Standards Association, 29 West 39th St., New York, 46 standards were approved by the association during the past year, of which 19 were entirely new and 27 were revisions of previous standards. A group of dimensional standards, including those for ball and roller bearings and dimensions of cut and ground taps, are of particular importance in the mechanical engineering field.

Charles F. Kettering, president of General Motors Research Corp., in a foreword to the book, reviews development in national and international standardization, and declares that lack of coordinated functioning with industries and between industries is the major cause of business fluctuations.

March Output Shows Gain

Bureau of Census Reports Vehicle Production at 276,341 Units for U. S.

WASHINGTON, April 24—Marking the fourth successive monthly gain, production of motor vehicles in the United States rose to 276,341 units in March from 219,939 in February, an increase of 56,402 units. The March output of passenger cars, amounting to 230,835, reflected a gain of 50,945 over February, while the production of trucks, rising to 45,096, registered an increase of 5576. The taxicab production declined to 410 from 529.

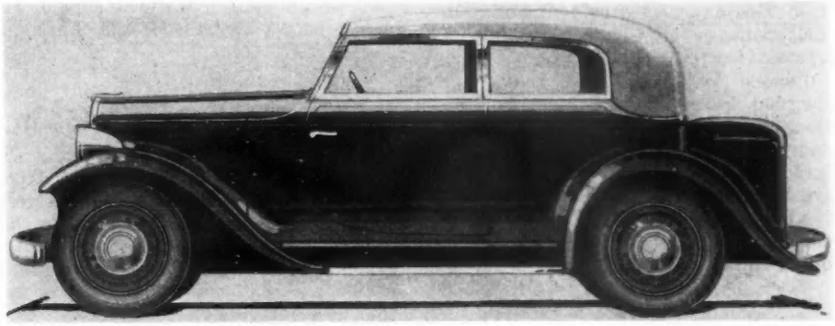
In the first quarter of 1931, however, motor vehicle production dropped to 668,131 from 1,000,023 in the corresponding period of last year. The passenger output was 548,530 as compared with 848,195, while truck production was 118,150 as against 148,589. Taxicab production was 1451, compared with 3239.

The production of motor vehicles in Canada in March increased to 12,993 from 9871. The passenger car output rose to 10,483 from 7529, while the truck production made a slight gain, totaling 2510 as against 2342. In the first quarter of the current year the output of motor vehicles in Canada was 29,360, compared with 46,666 in the corresponding period of last year. Passenger car output was 22,564, compared with 39,042, and the truck production was 6796 as against 7624.

U.S. Bought 208 Trucks in '30

NEW YORK, April 21—United States government departments purchased 208 motor trucks during the year 1930. Of this number the navy purchased more than any other one department, taking a total of 61 trucks during the year.

Facing Forward



The front seats of this new electric passenger car, produced by the Detroit Electric Car Co., face forward instead of backward, as they did in previous years. The type shown has a top speed (with the use of a speed shunt for short periods) of 35 m.p.h., and lists at $4,250. Another body type will be built at the same price, and a former model will be continued

Men of the Industry and What They Are Doing

Bauer Sets Out

George F. Bauer, export manager of the National Automobile Chamber of Commerce, left New York Tuesday, April 21, for a six months' lecture tour of the Far East, during which he will meet with local leaders to exchange experiences on highway transport development.

Accompanying Mr. Bauer is equipment which will enable him to present illustrated lectures on automobile operation, road construction and financing, traffic control and other subjects in the language and dialects of the various countries which he will visit. According to his tentative itinerary, Mr. Bauer will visit more than 50 cities in Japan, China, Chosen, Siam and India.

U.S. Alcohol Names Gillette

The appointment of Leslie S. Gillette as advertising manager of the United States Industrial Alcohol Co. and its subsidiary, the United States Industrial Chemical Co., Inc., has been announced by Glenn Haskell, vice-president of the parent company. Mr. Gillette's experience in the automotive and industrial fields goes back to 1922, when he joined the Chilton Class Journal Co., publishers of automotive business papers. Later he became technical editor at Detroit.

Detroit Dealers Elect

H. K. Chambers was elected president of the Detroit Auto Dealers Association, by the newly elected board of directors, following the annual meeting of the membership, last week. Chas. Abbott, of the Vanguard Motors, Inc., was advanced from the secretaryship to the vice-presidency; John F. Evans, of Seebaldt-Evans Co., former treasurer, was elected secretary, and Richard A. Cott, of the Cass Motor Sales was named treasurer.

McCreery Succeeds Spaidal

D. M. Spaidal, vice-president and general manager of General Motor Acceptance Corp., with which he has been connected for the past 12 years, has resigned as of June 1. He is succeeded by I. G. McCreery, who is also a vice-president of the company. Mr. Spaidal, who has had 45 years of active business life, is retiring from active business. Mr. McCreery, who has had several years of bank experience, joined the G.M.A.C. in April, 1919.

Scintilla Adds Two

D. J. Wilber, formerly divisional sales manager, and John H. Mayforth, a district sales manager for the Robert Bosch Magneto Co., are now connected with the Scintilla Magneto Co., Inc., Sidney, N. Y., a subsidiary of the Bendix Aviation Corp.

Prior to his last connection, Mr. Wilber was a sales engineer with the American Bosch Magneto Corp. Mr. Mayforth was with the Eisemann Magneto Co. for 14 years.

Gets Wright Award

T. P. WRIGHT

Mr. Wright, who is chief engineer of the airplane division of the Curtiss Aeroplane & Motor Corp., has been awarded the Wright Brothers medal of the Society of Automotive Engineers, awarded annually to "the author of the best paper on aerodynamics or structural theory or research, or airplane design or construction, which shall have been presented at a meeting of the society." Mr. Wright's paper dealt with the development of the Curtiss "Tanager," the airplane which received the Guggenheim Safe Airplane Award.

Francis A. Hardy

Francis Alonzo Hardy, 80 years old, former president of Diamond Rubber Company, Akron, Ohio, and chairman of the board of B. F. Goodrich Rubber Company, died April 19 at his home in Pasadena, Calif. He retired from business in 1921, and at the time of his death was a director of the Simmond Match Co.

Dodge Truck Orders Gain

DETROIT, April 20—Walter S. Graves, truck sales manager, Dodge Brothers Corp., reports that the first 10 days of April, as compared to the corresponding period in March, showed an increase in dealers' orders of 50 per cent. Retail deliveries for the week ending April 4 were 29.8 per cent ahead of the previous week, and compared to the week ending March 14 this increase was 63.9 per cent.

Flat Steel Prices Shade

New Discount Schedule Expected on Bolt and Nut Purchases

NEW YORK, April 23—More than by any other development at the annual meeting of the United States Steel Corp. the steel market was impressed by President James A. Farrell's statement with reference to the price situation. "There has been a great deal of talk about prices," said Mr. Farrell; "as a matter of fact, if we can get a little better tonnage on present prices we are going to have a reasonably good year." While market conditions of themselves preclude any major movement in prices, President Farrell's statement serves to make clearer the price policy of the leading interests.

There continues, however, emphatic disparity between conditions in the sheet and strip market and those in steel bars. Hot-rolled strips, 6 to 24 in. wide, are now quoted at 1.50 cents Pittsburgh, denoting a decline of $1 a ton from recently prevailing prices. For 6 in. and under the nominal quotation of 1.65 cents continues with every indication that before long a similar downward revision as in the other division will come to pass.

Returns for March to the National Association of Flat Rolled Steel Manufacturers show an increase of 70,000 tons over February sales. Nearly 65 per cent of capacity was engaged as compared with 50 per cent in February.

Sheet mills are operating this week at a good rate, two idle Mahoning Valley mills having been able to resume because of receipt of automotive orders. A new set of discounts is expected before long for bolts and nuts. Belgian products have been offered at seaboard points at sharply lower prices than the 73 per cent discount-off-list heretofore generally quoted, and domestic mills are expected to meet this competition more energetically. The result, it is said, will be greater variation in manufacturers' discounts. Growth in the demand for chromium steels of the stainless type from automotive consumers is emphasized by the entry into the field of the leading interest and acquisition from the German patentees of process rights for that purpose.

Pig Iron—Fair demand from Middle West automotive foundries continues. The market is easy at unchanged prices.

Aluminum—Unchanged.

Copper—The market quickly got over another setback which for a very brief spell made copper available at 9½c. On Monday the opening price was 9¾c, with the nominal official price 10c, delivered Connecticut Valley.

Tin—A new low for the year was chalked up in the tin market on Monday when spot Straits was offered at 24.65c.

Lead—Reports are current that producers have agreed to reduce output by 15 per cent beginning May 1. Storage battery demand is light. Prices unchanged.

Financial Notes

General Tire & Rubber Co. has declared regular quarterly dividend of 75 cents a share on common stock payable May 1 to holders of record April 24.

Packard Motor Car Co. and subsidiaries report net profit for the quarter ended March 31 after all charges of $113,004. This is equivalent to one cent a share on outstanding stock and compares with earnings of $2,654,247, or 17 cents a share, for the corresponding quarter of last year.

American Austin Car Co., Inc., reports net loss for the year 1930, from May 23 to December 31, of $1,078,397 after all charges.

Hudson Motor Car Co. reports net income for the first quarter of the current year of $226,395, or 14 cents a share, after all charges. This compares with earnings of $2,316,945, or $1.45 a share, for the corresponding quarter a year ago.

Willys-Overland, Inc., and subsidiaries report net profit for the first quarter of the current year of $117,106 after all charges.

Brockway Motor Truck Corp. and Indiana Truck Corp. report net loss for the year 1930 of $3,551,857. This includes charges against a surplus account for extraordinary charges and provision in anticipation of future losses. This figure compares with profit for the previous year of $280,044.

Pierce-Arrow Motor Car Co. reports profit for the first quarter of the current year of $306,449. This is equal to 43 cents a share on Class B stock after Class A dividends and compares with earnings for the corresponding period of last year of $461,401, or 70 cents a share on Class B stock.

Bohn Aluminum and Brass Corp. reports net profit for the first quarter of $437,296, equivalent to $1.24 a share on capital stock, and compares with earnings of $395,386, or $1.12 a share, for the corresponding period of last year.

Motor Products Corp. reports for quarter ended March 31st a net profit of $92,687, after depreciation and Federal taxes, equal to 47 cents a share on 195,699 no-par shares of common stock. Net profit for the first quarter of 1930 was $232,019, or $1.17 a share on 197,366 shares.

Budd Wheel Co. reports net earnings for the first quarter of 1931 of $214,079. This is equivalent to 20 cents a share on common stock after all charges, including preferred dividends, and compares with earnings of $413,613 for the corresponding period a year ago.

Edward G. Budd Mfg. Co. reports net earnings for the first quarter of 1931 of $28,020, as compared with $20,691 for the entire year of 1930. The company took no action on dividends.

Allied Motor Industries, Inc., and subsidiaries report consolidated net loss for 1930 of $394,580 after all charges. This compares with net profit in 1929 of $211,600, equivalent after dividends of $4 preferred stock to 47 cents a share on common stock.

Chicago Yellow Cab Co. reports net profit in the first quarter of 1931, after taxes and charges, of $408,300, equivalent to $1.02 a share on common stock. This compares with net profit of $526,499, or $1.31 a share, in the corresponding quarter of 1930.

Curtiss-Wright Flying Service and subsidiaries report net loss for 1930 of $3,597,771 after interest, inventory adjustments and other charges.

Graham-Paige Motors Corp. reports for the first quarter of 1931 an approximate loss of $175,000 after all charges, as compared with net loss of $489,480 in the first quarter of 1930. After loss of $150,000 in January, 1931, the deficit in February was reduced to $90,000 and in March operations were reestablished on a profitable basis.

Hayes Wheel and Forgings, Ltd., reports for 1930 net loss of $193,694 after all charges. This compares with net income of $250,846, or $3.50 a share on common stock in 1929.

General Tire & Rubber Co. has declared regular quarterly dividend of 10 cents a share on common stock, placing it on a 40 cents annual basis. A dividend of 20 cents was paid Jan. 2, 1931.

DR. OSCAR C. BRIDGEMAN

Gets Manly Medal

Dr. Oscar C. Bridgeman, research associate of the Bureau of Standards, Washington, has been awarded the Manly Memorial Medal for 1930, given annually by the Society of Automotive Engineers to the "author of the best paper relating to the theory or practice in the design or construction of, or research on, aeronautic power plants or their parts or accessories." Dr. Bridgeman's paper which received the award was delivered last May at the Summer Meeting of the S.A.E.. Its title was "The Effect of Airplane Fuel Line Design on Vapor Lock."

Foundrymen Plan Program

CHICAGO, April 21—The tentative program for the 1931 convention of the American Foundrymen's Association, to be held at the Hotel Stevens, May 4-7, includes the following papers: Electric Process Iron for Cylinder and Cylinder Head Castings, by H. E. Bromer, Standard Foundry Co., Racine, Wis.; Factors Which Influence the Surface Quality of Gray Iron Castings, by W. G. Reichert and D. Woolley, Singer Manufacturing Co., Elizabeth, N. J.

Chicago Sales Gain 22% in "Showing"

County Dealers Report Business Pick-up With Spring Drive

CHICAGO, April 20—Cook County automobile dealers increased their business 22 per cent over the volume the previous week, and 61 per cent over the sales for the same dates of last month, during the first week of Chicago's spring showing.

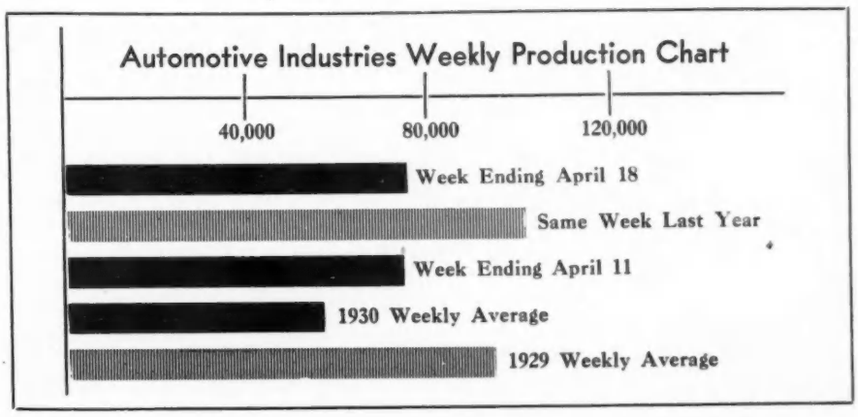
Dealers expect a larger increase to show in figures for the second and final week of the drive. Sales for the first week of the campaign totaled $2,555,000 while the previous week totaled $2,100,000, and the same dates of last month, March 12 to 18 inclusive showed $1,589,000.

Approval of the showing by leaders of the industry have been received from all sides. "The Spring Showing which 600 of Chicago's authorized new car dealers, under the supervision of the Chicago Automobile Trade Association, are promoting is undoubtedly a most effective plan of introducing new cars.

"The Association should be congratulated upon its initiative in preparing a plan with so many ramifications to interest the motorist and make Chicago new car conscious. If for no other reason, the unprecedented values possessed by the 1931 models should give this event an unusual appeal to everyone in the Chicago territory," Alvan Macauley, president of the N.A.C.C., wired.

Used Car Taxation Reduced in Germany

BERLIN, April 7 (*By Mail*)—On March 27 a law was approved in Germany effecting a material reduction of motor taxes from April 1 onward for used cars older than five years, and exceeding a piston displacement of 213 cu. in. Cars up to 317 cu. in. will only pay taxes as for 213 cu. in., and such exceeding 317 cu. in. will pay one-third less than the normal rate.



Sees U. S. Benefit in Soviet Trade

James D. Mooney Says Russia is a Good Credit Risk; Is Becoming Stable

NEW YORK, April 21—American business in Russia can be expanded to a remarkable extent in the opinion of James D. Mooney, vice-president of General Motors Corp., who recently returned from an extensive business trip through the Soviet Republic in

JAMES D. MOONEY

the interest of his corporation's overseas operations.

"Russia is an excellent customer of the United States now. If we sell to Russia, we must be prepared to buy from her. The Russians quite naturally will insist on this as time goes on," he declared in a national chain broadcast Tuesday evening.

"As traders, the complexion of Russia's political system, or system of government, should interest us no more than such complexions in any other of the many countries in which we do business.

"The formal structure of the Russian government is well crystallized. There is a general emotional background supporting the structure.

"The political forces in the government are very cleverly carrying out a rigid indoctrination among the Russians everywhere that is resulting in a permanent 'set' of the government institutions that have been established. These conditions are all indicative of permanency and stability in the government.

"Russia is a good credit risk. Her great resources and her aggressive economic program will provide the capacity to pay her bills. Russia's will to pay has been evidenced by her good credit history, and she has every reason to guard her excellent credit record."

It is important in observing the Russian experiment, he pointed out, not to be thrown off the track by the incident that the revolution in 1917 took as one of its symbols the red flag.

"Much water has gone over the dam since then, and the practical necessities of the situation have forced the Russian government and the Russians to organize according to good old-fashioned methods.

"In the newspapers and in the articles about Russia from which we in America draw our impressions, Communism receives publicity out of all proportion to its practical application in Russia.

"On the other hand, too little is known in America about what is really going on in Russia, particularly in relation to the job they have to do in developing the country and the way in which they are going about it," he said.

"It is very difficult to find flaws in the Russian economic thinking, as expressed in their actual plans and actions. Certainly they are very wise, for the long pull, in putting an embargo on consumer goods and importing only productive machinery, tools and equipment.

"They have been straining themselves, and taking some temporary punishment in their standards of living by exporting wheat and oil and timber and even some manufactured goods, to establish credits to pay for tools. But isn't this commendable?

"We certainly approve of the man in our country who has the courage to make sacrifices in his own personal expenditures, so that he can put his money back into the business."

Too little of our thought, and too few of our laws are concerned with us as consumers. We discuss ourselves almost exclusively as producers, he believes.

"We shall be on our way toward meeting the Russian menace if and when through a better understanding of Russia's objectives and the way in which she is going about their realization, we set up to trade with her on an intelligent basis.

"The fact is that Russia, particularly in her primary products, which, at least over the immediate period ahead, are the principal things she will have to sell, is in a position to furnish us some things which we need, and which she is in a better position to give us than we are able to supply ourselves.

"On the other hand, we have many things, particularly in our manufactured articles, which she needs, and which we are in the best position to supply.

"Obviously, then, the situation is solved to the best effect when we set up with Russia to trade in these things.

"There is no danger for us in this, providing it is intelligently handled. On the other hand, there is a great benefit to be derived. The real danger arises out of our present inclination to shut our eyes to the economics in the situation."

Parts Business Shows Gain

Original Equipment Makers Also Note Improvement for March

NEW YORK, April 21—Parts and equipment business during March showed a decided uptrend, although still falling far short of March of last year, according to monthly index figures of the Motor and Equipment Association.

Comparatively ambitious car production schedules for April are reflected in the March figure for original equipment, which rose to 117 from 95 for the previous month. This figure, however, compares with 167 for March of 1930.

Replacement parts also showed a marked increase for this year, with an index for March of 110 as compared with 99 in February, but are again considerably behind last year, when the March index was 139.

Accessories show less the effect of current business conditions, moving through a comparatively seasonal cycle. The March index in this group is 65 as compared with 53 in February and with 67 in March, 1930.

Shop equipment index for the month is 115, being an advance of nearly 20 points from the February figure of 97, but in common with other groups, falling considerably behind the March, 1930, figure, which was 175.

As a result of the activity in various groups, the grand index for the month is 113, or 20 points above February, which was 93. The grand index compares with 155 for March of last year.

Graham-Paige Elects

DETROIT, April 21—Mrs. Alfred G. Wilson, the former Mrs. John Dodge, yesterday was elected a director of Graham-Paige Motors Corp.

Herbert I. Lord, vice-president and director of Detroit Lubricator Co., also was elected to the Graham-Paige board.

Mrs. Wilson's election to the Graham-Paige board revives the old associations between Dodge Brothers and Graham Brothers.

Detroit Lubricator Co. manufactures carburetors for Graham passenger cars and Paige commercial vehicles.

Rubber Prices Drop

NEW YORK, April 21—Crude rubber prices reached a new low level of 6 cents a pound in New York with a corresponding decline in prices in the London market, according to the Rubber Exchange of New York. Stocks in London and Liverpool have continued to show increases and production in Malaya and other producing countries are still far in advance of world requirements.

Airlines Doubled Their Use in 1930

More Than Twice Number of 1929's Passengers Were Carried by Them

WASHINGTON, April 23—A total of 417,505 persons were passengers on the domestic and foreign scheduled air lines of American operators during 1930, more than twice as many passengers as were carried by the scheduled air transport companies in 1929, it was announced today by the Aeronautics Branch of the Department of Commerce upon completion of its survey of operations for the last half of 1930.

The miles flown in 1930 were 36,945,203, an increase of more than 10,000,000 over 1929. Mail carried in 1930 amounted to 8,324,255 lb., and express was 2,869,255 lb., both figures representing substantial increases over the previous year.

For the last half of 1930 it was found that 20,042,475 miles were flown by 55 transport companies operating 137 routes. These lines carried 209,148 passengers during the six-month period, 4,562,879 lb. of mail and 1,623,778 lb. of express. Passenger miles flown were 51,482,633, a passenger mile being the equivalent of one passenger flown one mile.

Libbey Plants Stepped Up

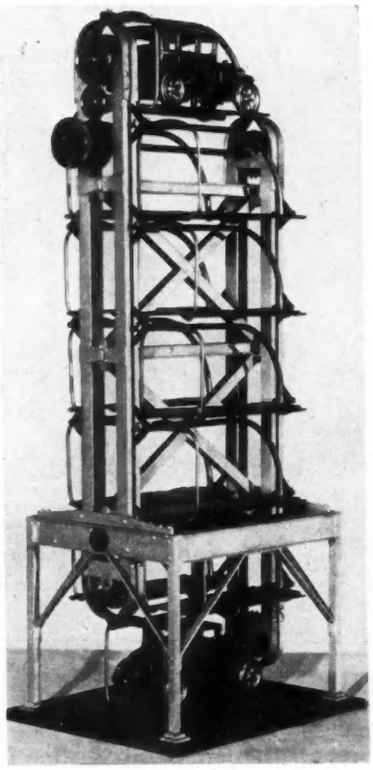
TOLEDO, April 22—Increased April schedules by seven motor car manufacturers has resulted in a large increase in orders for safety glass received by Libbey-Owens-Ford Glass Co. and starting of its East Toledo plate-glass plant on a 24-hour basis. Two hundred workers were added this week. The laminated glass plant has also been stepped up. Both of these plants reflect directly general improvement in automotive demand.

Willys Reports Profit

TOLEDO, April 22—Net earnings of $117,106 after depreciation, taxes and other charges were reported by Willys-Overland Co. for the first quarter of 1931. Compared to the same period of last year, an improvement of $1,302,018 is shown after eliminating federal tax recoveries in both years.

Lamp Companies Merge

CHICAGO, April 22—Indiana Lamp Co., Connersville, subsidiary of Allied Products Corp., the J. W. Brown Manufacturing Co. of Columbus, and the Thomas J. Corcoran Lamp Co. of Cincinnati have merged under the name of Corcoran-Brown Lamp Co.



Parking by Westinghouse

The new automatic parking machine, developed by the Westinghouse Electric and Mfg. Co., has spaces for 12 cars. An endless chain, motor-driven, carries the cars from where they drive in at the ground level to a position up out of the way. The device can be operated automatically with the use of a coin slot or special keys, which control the stopping position

Rubber Association Elects

NEW YORK, April 22—The Rubber Manufacturers Association, Inc., has elected J. D. Tew, president of the B. F. Goodrich Co., as its president, succeeding the late Samuel Woolner, Jr.

F. B. Davis, Jr., president, United States Rubber Co., has been elected first vice-president, and C. D. Garretson, president, Electric Hose and Rubber Co., remains as second vice-president.

W. H. Lalley, president, Kelly-Springfield Tire Co., and Herbert E. Smith, vice-president of the United States Rubber Co., have been elected to the board of directors, succeeding Mr. Woolner and H. L. McClaren, who has resigned.

A. F. Townsend, president of Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., and Mr. Lalley have been elected members of the executive committee, succeeding P. W. Litchfield and Mr. Woolner.

Reo Adds Coupe

DETROIT, April 21—Reo Motor Car Co. is announcing the addition of a convertible coupe on the 135-in. wheelbase Royale chassis. The list price is $2,945. The model is featured by a neatly folding top.

Canadian Exports Drop in February

Decline From January and From Corresponding Month of 1930

WASHINGTON, April 23—Canadian automotive exports during February showed a heavy decline as compared to January and to the corresponding month of last year, according to the Commerce Department's Automotive Division.

In February, 1931, Canadian motor vehicles valued at $671,381 were exported, as compared with $1,297,544 in the first month of 1931 and 1,734,840 in February, 1930. Shipments of passenger car units decreased by 51 per cent, the greatest decline taking place in the low-priced units. Exports of passenger cars valued from $500 to $1,000 declined by 29 per cent, while those valued under $500 were 54 per cent below shipments in the month previous.

Specifications Discussed

PHILADELPHIA, April 20—New Government specifications for gasoline and motor oil will probably be issued within a few months. These have been under discussion between representatives of the Government and various groups representing the petroleum industry for over a year. The final public discussion of the proposed specifications took place last week in St. Louis at the meeting of the A.P.I., where some of the final details were settled.

While the matter cannot be regarded as definitely settled until the proposals have been adopted by the Specification Board of the Government, it is practically certain that there will be only one specification for U. S. Motor Gasoline, so drafted as to permit the purchase of either summer or winter types of fuel. The new motor oil specifications for Class "D" oils are based on the S.A.E. numbers and are designed to provide high grade oils equal in quality to the best branded motor oils.

Chrysler Holders Elect

DETROIT, April 21—The annual meeting of stockholders of Chrysler Corp. was held today at the company's Highland Park plant. Shares voted at the meeting constituted 70 per cent of the total shares outstanding, one of the largest representations of stockholders at any of the company's annual meetings. Since the last annual meeting the number of stockholders has increased from 39,973 to 45,929, a new high record. The directors elected at the meeting were George W. Davison and Marshall E. Sampsell, replacing Hugh Chalmers, resigned. Other directors were reelected.

Tractor Production Off 10% in 1930

Last Year's Export of Threshers Larger Than 1929 Figure

WASHINGTON, D. C., April 23—The Bureau of the Census announces that according to returns received to date in the annual canvass of manufacturers of farm equipment and related products, the total production of tractors of the wheeled type (not including garden tractors) in 1930 amounted to 176,075, valued at $123,291,346; of garden tractors, 5711, valued at $986,966; of combines (harvester-threshers), 24,400, valued at $32,738,500; and of threshers, 9000, valued at $7,407,000. These figures, as compared with those for 1929, represent heavy decreases for the three large items and a smaller decrease for garden tractors.

No statistics on the production of tractors of the tracklaying type in 1930 can be given without disclosing approximately the output of individual manufacturers.

The statistics for 1930 are preliminary and are subject to such correction as may be found necessary after further examination.

Production of Wheeled Type Tractors, Etc., in 1930

		Manufactured		Sold by manufacturers: For domestic use		For export	
		Number	Value	Number	Value	Number	Value
Tractors, wheeled, type (not including garden tractors)*, total	1930	176,075	$123,291,346	113,160	$75,854,274	43,666	$34,146,303
	1929	195,980	$141,653,219	136,310	$95,777,829	51,318	$37,851,479
Garden tractors	1930	5,711	$986,966	4,064	$743,957	489	$79,141
	1929	5,895	$907,755	4,732	$747,443	582	$91,734
Combines (harvester-threshers)	1930	24,400	$32,738,500	17,000	$21,525,000	5,500	$7,955,600
	1929	36,957	$50,683,541	19,666	$27,857,315	10,009	$13,264,087
Threshers	1930	9,000	$7,407,000	9,000	$7,245,000	1,600	$1,591,000
	1929	14,571	$12,773,439	11,546	$10,343,919	1,411	$1,354,182

*Although statistics for tractors of the tracklaying type were reported for 1929, they can not be given for 1930 without disclosing an approximation of the output of an individual manufacturer. The 1929 figures for tracklaying tractors are as follows: Manufactured, 27,101, valued at $53,601,569; sold by manufacturers for domestic use, 19,000, valued at $37,699,581. No figures can be given for sales by manufacturers for export without disclosing the data for an individual manufacturer. (The difference between the total production and the sales for domestic use does not represent sales for export, for the reason that a part of the production reported for any one year is not sold until after the close of that year.)

Mrs. Pulcher Dies

DETROIT, April 21—Mrs. Martin L. Pulcher, wife of the president of Federal Motor Truck Co., died at her home here Monday.

Gear Makers to Meet

PHILADELPHIA, April 20—The fifteenth annual meeting of the American Gear Manufacturers Association will be held at the Hotel Statler, Buffalo, N. Y., May 7, 8, and 9. Among the papers scheduled for the meeting is one on Non-Metallic Gears and their Operating Characteristics, by C. W. Mansur of the Plastics Department, Gear Division, General Electric Co., and another on Strength and Durability of Spur-Gear Teeth, by Professor Earle Buckingham of Massachusetts Institute of Technology. At the annual dinner, which will be held on Friday evening, May 8, the principal speaker will be R. W. Lindsay, vice-president of Pratt & Lambert, Inc., Buffalo, N. Y.

De Vaux Under Way

GRAND RAPIDS, MICH., April 20—De Vaux-Hall Motors is now producing 65 cars a day at the Grand Rapids plant. According to George R. Scott, vice-president in charge of manufacturing, this figure will be greatly increased within the next few weeks. The plant has been operating on a low schedule due to delayed delivery of materials.

"Orders on hand warrant capacity production," Scott said, "but apparently our sources of supply underestimated the time we required to get into production and we have not received materials in the quantities required.

"The Oakland factory commenced production April 15. We are rushing delivery of supplies in our effort to reach a daily production of 100 cars in the Oakland plant."

No. 20,000,000 Steps off

Henry and Edsel Ford are shown standing beside Ford car No. 20,000,000 shortly before Mr. Ford personally drove it from the Dearborn assembly line Tuesday, April 14. Charles E. Sorenson, general manager of the Ford Motor Co., is shown seated within the car.

Industry Leads in Rehiring

WASHINGTON, April 23—Reports received by the Bureau of Labor Statistics, Department of Labor, for March regarding labor turnover rates, show that the automotive industry had the highest "accession" rate, 7.76. The report covers manufacturing as a whole and eight separate industries. The other rates in the automotive industry were: Quit, 1.09; discharge, 39; layoff, 1.71. On an equivalent annual basis, the labor turnover rates for the automotive industry were: Quit, 12.8; discharge, 4.6; layoff, 20.1; accession, 91.3

Combine Formed to Control Fuel

World Oil Interests Outside of U. S. and Germany Join in Huge Patent Pool

LONDON, April 7 (*by mail*)—An announcement was made here today of the organization of the International Hydrogenation Patents Co., Ltd., representing the interests of the Standard-I. G. Co., Royal Dutch-Shell Group and Imperial Chemical Industries in the hydrogenation process for the liquefaction of coal and the refining of oils in all countries of the world outside the United States and Germany.

The seat of the new company is in Vaduz, Liechtenstein, and the directors are: F. Godber, London; P. Hurll, London; H. Jacobson, The Hague; J. B. A. Kessler, London; Dr. August von Knieriem, Mannheim; J. E. F. de Kok, The Hague; J. A. Mowinckel, Paris; Lieutenant-Colonel G. P. Pollitt, D.S.O., London; H. von Riedemann, Zurich; and H. G. Seidel, Paris.

There will be organized in the near future an International Hydrogenation Engineering & Chemical Co., having its seat at The Hague, the staff of which will be drawn from the technical staffs of the interested companies; this will be the channel through which the skill and experience of these groups and of all licensees will be made available to all users of the hydrogenation process for the design and operation of plants.

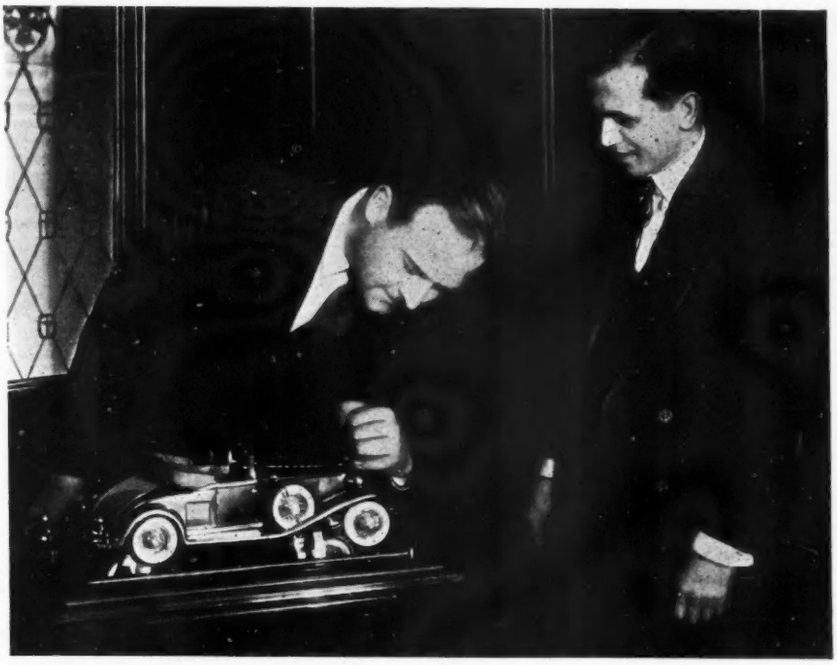
The International Hydrogenation Patents & Engineering Co. will have full working arrangements for the exchange of patent rights and experience with corresponding companies in the United States organized last year, in which the same groups are also indirectly interested, the U. S. companies being controlled directly by the principal units of the American oil industry. German inventions and experience will be available to the new company through the Standard-I. G. Co., representing the original fusion of hydrogenation interests between I. G. Farbenindustrie and Standard Oil Co. (New Jersey).

German Tax Income Low

BERLIN, April 7 (*by mail*)—The German Government in this year's estimates had hoped to raise an income from motor taxes (incl. motor cycles) of 230 million marks, but the income actually received in January and February shows this figure will not be reached.

The receipts are lower than during the same months in 1930, when in January 15.08 million marks and in February 13.72 million marks came in. This year the corresponding figures were: 14.36 million and 12.9 million marks.

Look Here, Mr. Cord



An exact scale-model of E. L. Cord's personal car was presented to him by L. B. Manning, vice-president of the Cord Corp., and other associates at the recent annual meeting of the Corporation in Chicago. The illustration shows Mr. Manning pointing out to Mr. Cord some of the workmanship detail on the model. All details of the replica are exact and represent the work of five Swiss watchmakers for six months.

Nash Sales Up 16%

KENOSHA, WIS., April 20—Nash Motors Co. orders in the first half of April were 6.16 per cent greater than the total shipments in March. March shipments were greater than those made from the factories in any month since April, 1930, with the exception of October, when the four new series of Nash cars were introduced. Orders for April delivery in the first fifteen working days this month increased 72.68 per cent over the orders on hand at the beginning of the month.

Plymouth Deliveries Gain

DETROIT, April 25—For the tenth consecutive week, retail deliveries of Plymouth cars have shown a marked increase, according to a statement authorized here today by Plymouth Motor Corp. Final delivery figures for the week ending April 4, as reported by Chrysler, Dodge and De Soto dealers, show a 12 per cent increase over the last week in March.

Marketing New Propeller

NEW YORK, April 20—Curtiss Wright Corp. has developed and is now ready to market a controllable pitch propeller. Blades are operated by an electric motor contained in the hub and can be turned completely around. Thus, if one motor on a multimotored plane goes dead the blades of that propeller can be feathered to reduce resistance. The company has also developed a one-piece propeller. This company is now marketing generally an anti-drag ring for installation around the engine to reduce head resistance. This ring is being manufactured in quantity and sold to other engine makers as well as being installed on Curtiss Wright types.

Marmon Using Night Shift

INDIANAPOLIS, April 21—For the first time in more than two years the Marmon Motor Car Co. is operating a night shift in its factory, it has been announced today by G. M. Williams, Marmon president. This additional activity is the result of greatly increased orders for the two lines of Marmon eight-cylinder cars and a heavy demand for the new 200-hp. Marmon 16, Mr. Williams said. Since the announcement of free wheeling on the low-priced Marmon 8, orders have been received in the largest volume of the year and the Marmon big 8 also is enjoying an unusual degree of acceptance.

Dodge Deliveries Increase

DETROIT, April 20—Retail deliveries of passenger cars and trucks by Dodge dealers in the United States for week ending April 4 showed an increase of 13.7 per cent, as compared to the preceding week, according to A. vanDerZee, general sales manager, Dodge Corp.

Plane Makers Set Practice

Adopt Standard Code to Insure Safety of Transport Operation

DETROIT, April 20—Held in conjunction with the National Aircraft Show in Detroit last week, the various sessions of the Aeronautical Chamber of Commerce were notable for the more stringent requirements which transport operators and manufacturers of transport planes are setting themselves, in order to assure continued progress of this fundamental branch of the industry. Among the various activities in this direction was the adoption of a code of standard practices to insure safety.

A uniform system to facilitate interchange of traffic between air transport lines also received considerable study, while a further move was to authorize the Chamber to study air transport maintenance methods designed to reduce operations costs.

Included in the new safety code are more stringent requirements for aircraft pilots. Transport pilots have been separated into three groups. The larger the plane, the more severe the qualifications required. An important rule of the new code referred to the adoption by each operator of a rigid policy with respect to weather conditions under which flying will be permitted, and its corollary—the establishment and maintenance of a complete system for the check and control of operations.

Under the terms of the interchange of traffic agreement, 30 lb. of baggage will be carried free by all lines, weight and space of the plane permitting, with a charge on excess baggage up to 20 lb. additional at one-half of one per cent of the air fare per pound. The session on this subject was enlivened by the passage of a number of rules, such as that "Pet Pomeranians cannot be carried in the passenger cabin of closed ships."

Preliminary proposals for the location of the 1932 National Aircraft Show were received from two cities, Indianapolis and Kansas City.

In the design end, the Chamber recommended further work on the elimination of fumes in the cabin, reduction of noise, decreasing fire hazards, especially in reference to the location of gasoline tanks, provision of proper ventilation, provision of more ample headroom, and the use of safety glass throughout.

Dutch Growers Associate

NEW YORK, April 20—Dutch rubber growers, at the meeting held in Amsterdam last week, decided to form an association for the purpose of promoting a rubber restriction scheme, according to advices received here by The Rubber Exchange. The association is to function for the next five years.

Eaton Adds Night Shift

MASSILLON, OHIO, April 21—Increased business has resulted in increased operations at the local plant of the Eaton Axle & Spring Co., with a night shift working now. Approximately 150 men are employed by the company.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Altoona, Pa., Automobile.....April 15-27
International Garage Exposition, Berlin, Germany .....May 9-Aug. 9

CONVENTIONS

Natl. Battery Mfg. Assn. Convention, Niagara Falls .....April 24-25
Eastern Carolina Exposition, Greenville, N. C. .....April 27-May 1
U. S. Chamber of Commerce, Atlantic City .....April 28-May 1
American Foundrymen's Assn., Chicago .....May 4-7
International Chamber of Commerce, Washington, D. C. .....May 4-9
S.A.E. Spring Production Meeting, Milwaukee .....May 7-8
American Gear Mfg. Assn., Buffalo, New York .....May 7-9
Associated Business Papers, Hot Springs, Va. .....May 11-13
American Society Mechanical Engineers, Baltimore .....May 12-14
American Roadbuilders Assn., Washington .....May 15
Automotive Engine Rebuilders Assn., Chicago .....May 18-21
American Society Mechanical Engineers, State College, Pa.....May 22
Retail Delivery Assn. Convention, Washington, D. C. .....May 25-28
National Foreign Trade Council, New York .....May 27-29
Natl. Automobile Chamber of Commerce, New York City (Directors' Meeting) .....June 3
Natl. Automobile Chamber of Commerce, New York City (Members' Meeting) .....June 4
S.A.E. Summer Meeting, White Sulphur Springs .....June 14-19
Steel Founders Society (Mid-Summer), French Lick, Ind....June 17-19
National Association of Credit Men, Boston, Mass. .....June 22-27
American Society Mechanical Engineers, Madison, Wis. (Oil and Gas Power Meeting).....June 23-26
National Association of Taxicab Owners, Chicago, Ill. .....June 29-30
S.A.E. Aeronautic Meeting (in conjunction with Natl. Air Races), Cleveland, Ohio .....Sept. 1-3
American Welding Society, Boston, Mass. .....Sept. 21-25
National Safety Council, Chicago, Ill. .....Oct. 12-16
Society Industrial Engineers, Pittsburgh, Pa. .....Oct. 14-16

S. A. E. SECTION MEETINGS

April 28—Washington, D. C.

Producing New Plane

NEW YORK, April 22—Northrop Aircraft Corp., Ltd., subsidiary of United Aircraft & Transport, has produced a new all-metal, low-wing, open-cockpit monoplane named the Beta. This plane has capacity for one passenger in addition to the pilot and approximately 75 pounds of baggage. It is powered with a 165-hp. Menasco engine and has a cruising speed of around 145 m.p.h.

Tells President Need of Industry

George Hook, Chilton Editor, Reports Status of Business to Hoover

WASHINGTON, April 21—George T. Hook, editor of *Commercial Car Journal*, published by the Chilton Class Journal Co., presented the case of the automobile industry to President Hoover at the annual trade editors' conference in the White House. Seven trade publication editors attended the session to report to Mr. Hoover business conditions in their respective fields.

Reduced purchasing power and an over-cautious buying public were blamed by Mr. Hook for the slow progress of the automotive industry.

He said that automotive leaders believed that the recent tariff legislation was "definitely hindering recovery." Retaliatory measures have been taken by many foreign countries and American automotive products have borne the brunt of their efforts, he said.

The selection of a committee of 50 business leaders to organize and operate an "industrial mobilization board" to restore business prosperity, was advocated by Stanley A. Dennis, chairman of the National Conference of Business Paper Editors, in a radio address following the White House session.

Arrow Adds Sport Type

LINCOLN, NEB., April 21—An exceptionally high degree of longitudinal, lateral and directional stability is claimed for the Arrow Sport "85," manufactured by the Arrow Aircraft & Motors Corp., which recently received its Department of Commerce approval. The new model is powered by the LeBlond 85-hp. motor and is priced at $2,985.

Hercules Reelects

CANTON, OHIO, April 21—All officers of the Hercules Motors Corp. were reelected at the annual meeting of directors here. The board of directors also were reelected at a meeting of stockholders earlier in the day.

Franklin Schedules Up

Effective April 14, Franklin Automobile Co., Syracuse, New York, increased its final production schedule for April 12 per cent. The production schedule for April was originally set for 36 per cent above total March shipments.

Detroit Tube Reelects

DETROIT, April 20—At the annual meeting of stockholders of Detroit Seamless Steel Tube Co., last week, all retiring directors and officers were reelected for the coming year.